

TECHNICAL CONSTRAINTS TO SMALLHOLDER AGRICULTURE: CASE
STUDY OF NKONKOBÉ MUNICIPALITY, EASTERN CAPE,
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BY

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16 April 2008

DEDICATION

To my late Mother, Evangelista Goronga

DECLARATION

I, the undersigned, hereby certify that, unless specifically indicated to the contrary in the text, this thesis is the result of my original work and that to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any degree or diploma of the University of Fort Hare or any other institution of higher learning, except where due acknowledgement has been has been made in the text.

Dated at Fort Hare University on this day of 15 April 2008

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Peter P.T. Pote

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ABSTRACT

Using data drawn from a sample of 80 farmers in the Kat River valley, this thesis presents the results of an assessment of the technical constraints affecting smallholder development and their implications for market access. A review of the relevant literature on the smallholder farm sector, technical change and technical constraints affecting smallholder farmers along with an overview of the agricultural marketing environment in South Africa has been presented. A critical review of the theoretical framework for consideration of technical change in agricultural development, with particular attention to the induced innovation model was undertaken.

General information on the institutional set up was obtained by open-ended interviews of community leaders and focus groups. These interviews supplemented information obtained through literature study and document analysis. The other method of data collection employed was the single-visit household survey using structured questionnaires.

The demographic and socio-economic characteristics of the surveyed farmers are described in this study. The selection process of the variables influencing market access was done by employing correlation and logistic regression analyses. Correlation analysis was conducted to ascertain the relationship among variables to find out the extent to which they mirror theory or intuition regarding their causation to constraints influencing market access. The logistic model was employed in the step-wise manner using each of key production inputs as response variables sequentially. On the basis of a binary logistic model, it can be concluded that the farmers still operate under a number of technical constraints. The most influential constraints are information, asset ownership, value of agricultural production and extension assistance. The study reflects the previous findings in South Africa that the legacy of apartheid continues to negatively impact on its agricultural economy.

Key words: Technical Constraints, Technical Change, Market Access, Smallholder Farmers, Agricultural Development, Induced Innovation Model, Kat River Valley, Correlation analysis, Theoretical framework and Binary Logistic Model

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ACRONYMS

ACP	African Caribbean and Pacific countries
Agri SA	Agri South Africa
AgriBEE	Agricultural Black Economic Empowerment
AIDS	Acquired Immune Deficiency Syndrome
ARC	Agricultural Research Council
BBBEE	Broad-Based Black Economic Empowerment
CASP	Comprehensive Agricultural Support Programme
DBSA	Development Bank of Southern Africa
DLA/DoA	Department of Land Affairs/Department of Agriculture
ECA	Eastern African Community
FDT	Farmer Development Trust
FSP	Farmer Support Programme
GDP	Gross Domestic Product
HIV	Human Immune Virus
IAC	Inter Academy Council.
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ISRDS	Integrated Sustainable Rural Development Strategy
LRAD	Land Redistribution for Agricultural Development
MAFISA	Micro Agricultural Financial Institutional Scheme of South Africa
MDGs	Millennium Development Goals
NAFUSA	National Farmers Union of South Africa
NAFU	National Farmers Union
NAMC	National Agricultural Marketing Council
NEPAD	New Partnership for Africa's Development
OECD	Organisation for Economic Co-operation and Development
RDP	Reconstruction and Development Programme
S&T	Science and Technology
SA	South Africa

SAQA	South African Qualifications Authority
SASIX	South African Social Investment Exchange
SPS	Sanitary and Phytosanitary
SPSS	Statistical Package for Social Scientists
SSA	Sub-Saharan Africa
STW	Shallow tube well
UNDP	United Nations Development Programme.
UN	United Nation

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

The importance of agriculture in the economies of the developing countries has long been recognised. It is generally agreed that agriculture will remain crucial to economic development and poverty reduction in Africa and South Asia (Jayne, Karanja, Nyoro, Strasberg, Strauss and Yamano, 1999; Upton, 2004) and African, Caribbean and Pacific countries (ACP) (Ingco and Nash, 2004) for the foreseeable future. In the first place, agriculture contributes to industrial growth through provision of cheap labour, capital for investment, foreign exchange earnings, market for manufactured consumer goods, enhanced rural incomes to support increasing numbers dependent on the industry, as well as food and raw material needs for the fast growing urban populations (Kydd, Dorward, Morrison and Cadisch, 2001). For the African continent, the agricultural sector plays an important role in terms of its contributions to the Gross Domestic Product (GDP), employment and income (Nkamleu, Gokowski and Kazianga, 2003). In a situation where industrial capacity is low and the service and tertiary sectors are weak, the only hope for development for most of these countries is in agriculture.

According to DeVries (2000), the multi-functional role of agriculture in many developing countries implies that various developmental activities hinge around the sector. It is thus recognized that agricultural development must be a central policy goal in much of the developing world (Orden, Torero and Gulati, 2004). At the same time, according to Jayne *et al* (1999), the majority of the world's poor population lives in rural areas and relies on agriculture for their welfare. This means that the agricultural sector plays a crucial role in poverty reduction (Hanmer and Naschold, 2001). Many scholars agree that agricultural growth plays a pivotal role in poverty reduction but there is little consensus on what plan to adopt for enhancing agricultural growth in developing countries (World Bank, 2001).

But, as the literature indicates, the agricultural sector of sub-Saharan Africa is currently facing serious problems. Africa is the only continent in the world where per capita food production has been declining over the past four decades (Africa Union, 2005; Spencer, 2001; Enete, Nweke and Tollens, 2005; Eicher and Byerlee, 1997). In Sub-Saharan Africa, population growth has generally exceeded growth in agricultural output over the same period (Enete *et al*, 2005). United Nations estimates, as reported by the University of Pennsylvania's African Studies Centre, show that between 1981 and 1990, real GDP per capita in Africa had a negative average annual growth of 1.3% per annum (Economic Commission for Africa, 1996). Given that these countries are largely agrarian economies, implies that agriculture's share of GDP was definitely declining during that period. The share of agriculture's contribution to GDP fell from as high as 40% in the 1960s to 21% at the end of the century for most countries in Sub-Saharan Africa (Economic Commission for Africa, 2001). This is no doubt a very significant decline although it might reflect expansion in other sectors.

The impact of the foregoing situation on the food supply has already started to be felt, with shortfalls being experienced from time to time (Ruttan, 2002a). While the Green Revolution has as from the beginning of the mid-20th century contributed much to the production of food grains, it seems to have largely by-passed Africa where many people are still trapped in the vicious circle of poverty (Hogset, 2005). Across the continent, the incidence of chronic hunger is worsening (World Bank, 2001). World Bank data has shown that there is widespread statistical evidence that Sub-Saharan Africa (SSA) experiences the worst levels of poverty (World Bank, 2001). Recent statistics suggest that about 202 million people were chronically undernourished during 1998-2000 (NEPAD, 2003). By the mid 1990s, ECA estimates reveal that, out of all poor, food-deficit countries worldwide, 40 were unable to meet the food and nutritional needs of their people and 29 of them were in Africa (Economic Commission for Africa, 1996). Box 1 below attempts an elucidation of the situation and provides a comparison between Africa and other regions of the world. The picture of extreme destitution for the majority of the world's population is clearly disturbing.

Box 1. World poverty facts and figures

- Of the world's 6 billion people, 2.8 billion—almost half—live on less than \$2 a day, and 1.2 billion—a fifth—live on less than \$1 a day.
- 75% of these people live in rural areas and 60% of the absolute poor will still live in rural areas by 2025
- Over 50% of the poor depend directly on agriculture for their livelihoods
- Over 70% of the poor live in south Asia and sub-Saharan Africa
- In sub-Saharan Africa the incidence of absolute poverty is nearly 50% and the rate of poverty decline is six times lower than is needed to meet MDG1.

Sources: Hanmer and Nashchold (2000); IFAD (2001); World Bank, 2001

Box 1: World poverty facts and figures

Note: *MDG1 in Box 1 refers to the Millennium Development Goal One: Reducing poverty and hunger by half by 2015 (UNDP, 2003).*

There are various other challenges facing the agricultural sector in Africa and the rest of the Third World countries. There is a substantial amount of literature to suggest that low productivity due to underdeveloped agriculture is one of the major challenges (Hogset, 2005; The Millennium Project Hunger Task Force, 2004; Nel and Davies, 1999; Eicher and Byerlee, 1997; Enete *et al*, 2005). The situation is aggravated by rural-urban migration which can be traced to the policies employed by the first generation of post-colonial leaders such as Kwame Nkrumah of Ghana (Mine, 2006). Such leaders conscientiously applied the Lewis two sector model which assumes a stagnant agricultural sector whilst the urban sector is industrialising and often a source of employment (Bauer, 1956). Consequently, for many African nations, there has been a trend of rural – urban migration in search of employment by the economically active age groups (Mine, 2006). Whilst taking cognisance of the fact that migration due to developed agriculture is desirable, the rural agricultural sector in this respect has been neglected. Of course the notion that a developed agricultural sector needs to underpin overall economic development was not being taken into consideration. Expectantly, this growth model failed in Africa because it emphasised the role of industrialisation as an engine of economic development at the expense of the agricultural sector on which many of these nations rely (Mine, 2006; Kofi, 1980). Accordingly, there was inadequate

investment in agriculture resulting in increased expenditure on food imports and shortage of export earnings to sufficiently develop the industrial sector (Mine, 2006; Kofi, 1980).

In response to pervasive poverty and the large numbers of people involved, the international community has committed itself to achieving the Millennium Development Goals (MDGs), that focuses on halving the proportion of hungry and poor people by 2015 (UNDP, 2001, p.22). However, there are several obstacles to these targets. In this respect, the Millennium Project Hunger Task Force (2004) noted the high prevalence of hunger among smallholder farmers, herders, fishers and forest dependent people in most Third World nations due to institutional, technical and financial rigidities. As long as these constraints persist, the Food and Agriculture Organisation of the United Nations forecasts that the MDG targets will not be achieved (Millennium Project Hunger Task Force, 2004). Instead, an estimated reduction from the current estimates of about 842 million hungry people to 600 million is rather expected by 2015 (UNDP, 2001, p.22). On a broad regional basis, it is estimated that, on average, 45 to 50 percent of Sub-Saharan Africans live below the poverty line - a much higher proportion than in any region of the world except South Asia (World Bank, 1996).

The challenge for development practitioners is considering what strategies to adopt to eradicate poverty and hunger in the context of the MDGs. Hanmer and Naschold (2001) see expansion of agricultural production as the only way out of poverty. Lipton (1997) as cited by Stewart (2000), sees the current 'urban bias' as a major cause of low farm output and advocates a shift of strategy by policy-makers to focus on the rural sector. On its part, the Millennium Project Hunger Task Force (2004) calls for an increase in productivity of smallholder farms in less favoured areas that were largely bypassed by the original Green Revolution.

However, there are many obstacles to the growth of smallholder agriculture. One of the obstacles is persistence of antiquated production technologies because farmers do not adopt improved technologies whose benefits are not well demonstrated and they do not see any incentives to adoption of improved practices. Obi and Van Schalkwyk (2005) and

Nkamleu *et al.* (2003) noted the prevalence of outdated production technology as one of the major drawbacks to traditional agriculture. Sometimes, the technology which is introduced in packages is partially adopted in developing countries (Feder, Just and Zilderman, 1985). As a result, the partially adopted technology might not achieve what it is meant to accomplish when full package is used. In cases where some components of a technological package can be adopted autonomously, it is often a challenge for farmers to deal with several discrete technological options (Feder *et al.*, 1985). In such circumstances, there is a risk of adopting non-complementary technologies.

The declining performance of agriculture in Southern Africa in recent years can be attributed to the abovementioned constraints among other reasons. In this regard, the extremely high rates of poverty may be explained by the poor performance of the agricultural sector of the region (Van Schalkwyk, Seleka, Obi and Mashinini, 2005). In line with the foregoing, the rest of Sub-Saharan Africa portrays almost the same picture.

Although South Africa has one of the best performing agricultural sectors on the African continent and possibly in the world, the legacy of the apartheid regime's discriminatory policies means that the communal farming sector where the smallholders are dominant has not shared in this phenomenal success. For this reason, despite South Africa being officially regarded as an upper middle-income country, it is characterized by extreme disparities in income distribution, with the greater part of the population trapped in a vicious circle of poverty, meaning also that the greater proportion of wealth is in the hands of a minority (Pauw, 2005; Perret, 2002). Many researchers attribute this paradox partly to the dualistic structure of the country's agricultural sector which features a modern, highly capitalised commercial sector co-existing with a traditional, low-technology and small-scale communal sector (Ortmann and King, 2006). It is a fact that South African agriculture continues to be characterised by unequal distribution of land, economic assets, support services, market access, infrastructure and income (Oettle, Fakir, Wentzel, Giddings and Whiteside 1998).

Citing the Republic of South Africa (1995, p.5), Nel and Davies (1999) assert that the post-apartheid government has set a target to eliminate poverty by the year 2020. Agricultural development, especially for the most sidelined smallholder agriculture, is no doubt a key factor for achieving this objective. Although there are many poverty alleviation strategies, sustainable and profitable smallholder agriculture affords the best chance that rural poverty can be eradicated (Oettle *et al.*, 1998).

Agricultural productivity growth has largely been attributed to technical change. In this regard, advances in mechanical and biological technology are primary sources of growth in land and labour productivities. It is therefore necessary to increase investments in technical and scientific efforts if growth in food production is to keep pace with growth in demand for food (Ruttan, 2002a). However, a viable smallholder agricultural sector can be realised by ascertaining the specific constraints to its development with emphasis on institutional, technical and entrepreneurial factors in particular. Understanding the technical constraints affecting smallholder farmers in South Africa remains one of the critical areas for providing a sound basis for investment in order for agriculture to realise its full potential as a vehicle for poverty reduction and enhancement of the standard of living for the South African poor people (Oettle *et al.*, 1998).

Bekele, Viljoen and Ayele (2002) noted that, with increase in population and land scarcity, technological innovations and increase in productivity play a crucial role in increasing food production. The Millennium Project Hunger Task Force (2004) prescribes a paradigm shift from the conventional macroeconomic to science-based improvements as well as public commitment to hunger and poverty alleviation.

Constraints affecting the smallholder farm sector have had major implications on market access. Perhaps, it is at this juncture worthwhile to define a “market”. There are different dimensions regarding the definition of a market. In this regard, scholars such as: Cochrane (1957), Bressler and King (1970) and Shepherd, Geoffrey, Futrell and Strain (1976), as cited by Houck (1984), come up with different views of a market. Cochrane (1957) viewed a market as a space where supply and demand is taking place in the

presence or absence of some physical and institutional arrangements. Bressler and King (1970) also regarded a market as an area where supply and demand is at work but with the movement of goods in space and time not necessarily involved. Shepherd *et al* (1984) regarded a market as a group of competing buyers and sellers in the presence of trading facilities. However, for the purpose of this thesis, a working definition of a market is the one coined by Houck (1984, p.356) which is:

“... a collection of actual or potential buyers and sellers of a specific good or service. This collection has two characteristics: (1) none of the buyers has the option to purchase the item from sellers outside this collection and (2) none of the sellers has the option to sell the item to buyers outside this collection. The interaction of these buyers and sellers generates a set of interrelated prices and conditions of sale or use. The principles or facts determining which buyers and sellers are in this collection identify the market spatially, temporally, and politically.”

In South Africa, the dynamics of agricultural marketing systems are well recorded. In this regard, the shift from the monopolistic stance taken by control boards for several decades (Groenewald, Geldenhuys, Joosté, Balyamujura and Doyer, 2003, p.7) to a free market dispensation in response to globalisation of markets cannot be ignored (Department of Agriculture and Land Affairs, 2007; Directorate: Marketing, 2005; Groenewald *et al.*, 2003, p.7). In line with the foregoing, the new era of free markets meant farmers in South Africa were suddenly exposed to a new marketing environment (Groenewald *et al.*, 2003, p.7). This entails adjustments to the ever-changing agri-supply chain and its requirements (Van Roekel, Willems and Boselie, 2002).

From research carried out in Eastern Africa, Bahiigwa (2006) found that markets exist at domestic, regional and international levels. At the domestic level, there are three different types of markets for African farmers namely rural, urban and supermarkets. The rural markets or local markets are often within the proximity of farmers. Urban markets are found in urban areas and in some cases rural farmers have no direct access because they are distant from the average rural farmer. Supermarkets are mainly situated in urban areas

and demand products of high quality standards. Other markets exist at regional and international levels (Bahiigwa, 2006). There is substantial evidence to prove that the majority of smallholder farmers face a lot of obstacles in accessing any of these markets (Cruz, 2006).

The South African marketing environment presents lucrative opportunities for different farming enterprises (National Department of Agriculture Directorate: Marketing, 2005). However, certain conditions need to be fulfilled by farmers to be in a position to explore these opportunities. In this respect, awareness regarding modern supply chain requirements, including changing consumer demand in terms of taste, health and safety, sustainability, among other factors, need consideration (Van Roekel *et al*, 2002). In line with the foregoing, Pingali, Khwaja and Meijer (2005) noted that smallholder farmers in many cases encounter two major challenges which include the choice of enterprise and the ability to commercialise. The latter involves technical change because the commercialisation process involves introducing new production technologies and giving up antiquated farming techniques often used by smallholder farmers (Pingali *et al.*, 2005). Lack of market access is also an institutional issue involving asymmetry of information, lack of infrastructure, credit facilities, and high transaction costs among other reasons (Magingxa and Kamara, 2003).

Inadequate market information on the part of producers often put them in a poor bargaining position when marketing (Ministry for Agriculture and Land Affairs, 1998). Inadequacy or lack of infrastructure such as roads is a problem when accessing the market and in some cases result in high transaction costs (Machethe, 2004). Lack of credit facilities is detrimental to the acquisition of capital goods (Ahmed *et al.*, 2005). For instance, in the absence of a vehicle (capital good), farmers may face difficulties in accessing the market. Increased transaction costs such as the cost of information may deter farmers from participating in competitive markets (Makhura, 2001, p.25). As a result of institutional constraints, farmers are likely to be subjected to various forms of market imperfections. Ahmed, Peerlings and Van Tilburg (2005) described such market imperfections to be missing, thin, incomplete, shallow local, interlocked and distorted.

In South Africa, there are many factors influencing agricultural market access at both domestic and international level. One of the factors is that farmers must produce products that conform to certain standards regarding quality, packaging and labeling among other aspects (Department of Agriculture and Land Affairs, 2007). Another factor is that if farmers are to be in better bargaining position, output must be high enough to cater for economies of scale (Groenewald *et al*, 2003, p.8). In addition, having marketing information also becomes crucial (Ministry for Agriculture and Land Affairs, 1998). In order for marketing information to be accessible, there has to be necessary market infrastructure that facilitates communication (Machethe, 2004) and physical infrastructure such as roads to reach different markets (Narender, 2005; Machethe, 2004). There are many other factors which directly or indirectly influence market access namely: asset ownership (Makhura, 2001, p.33), good agricultural practices (Ortmann, 2002, p.126), extension (Umali and Schwartz, 1994), credit, labour and skills (Amani, 2004) among other factors.

1.2 The Research Problem

Although recent studies cite lack of well developed markets as a constraint to smallholder development in Third World nations in general, there are differences from one country to another. In some cases, agricultural markets exist and are relatively well developed but are inaccessible to rural poor farmers due to several factors such as: lack of technical knowledge, equipment, physical and marketing infrastructure as well as the incapability to add value and meeting market quality demands. While agricultural markets in South Africa exist and are to a large extent developed and generally accessible to the commercial farmers, there are shortcomings emanating from the failure of smallholder farmers to fully exploit them. The smallholders' constraints are largely attributed to both the legacy of the apartheid regime's discriminatory policies as well as being by-passed by the macro level reform processes. Although smallholder farmers are recognised, policy actions and studies generally exclude them, with attention being given to emerging and small scale commercial farmers. In line with the foregoing, this thesis explores the smallholder farmers' technical constraints and their implication for market access in

Nkonkobe Municipality of the Eastern Cape. In this case, certain specific constraints are ascertained and how they affect participation in output markets is determined.

1.3 The scope and objectives of the study

This study will examine the technical constraints in smallholder farming and their implications for market access. Understanding the nature of the constraints and how they affect market access is of paramount importance. It is expected that the results will provide the platform for policy makers to come up with a win-win policy which is essential in uplifting the living standards of smallholder farmers.

The specific research objectives of this study are to:

- Describe and assess the main characteristics of the smallholder farm sector in Nkonkobe Municipality of the Eastern Cape in South Africa.
- Assess the interaction of socio-economic production and marketing factors affecting the smallholder farm sector.
- Identify key technical constraints faced by smallholder farm sector and their implication for market access.

1.4 Hypothesis

General

- The majority of South African smallholder farmers do not experience problems accessing agricultural markets.

Working hypothesis

- Technical constraints are not inhibiting smallholder market access.

1.5 Outline of the dissertation

The background information on the technical constraints affecting smallholder farmers within a market access framework in South Africa is presented in Chapter 1. The remainder of this thesis is arranged into 6 chapters. Chapters 2 and 3 review the relevant literature regarding the smallholder agriculture sector including an overview of the technical framework for production and marketing. The methodology, constituting the background to the study area, the sampling procedure as well as data collection methods and instruments are presented in chapter 4. Chapter 5 and 6 presents the results of the empirical analyses and interpretation. Chapter 7 presents the major findings and recommendations.

CHAPTER 2

CHARACTERISTICS OF SMALLHOLDER AGRICULTURAL SECTOR AND AN OVERVIEW OF THE TECHNICAL FRAMEWORK

2.1 Introduction

This chapter presents a definition of the smallholder farmer, the characterisation and importance of the smallholder agricultural sector, a review of literature on constraints faced by farmers as well as the theoretical literature on technical change. The chapter begins by defining a smallholder farmer in the South African context followed by smallholder farm characteristics. The importance of smallholder farmers is also highlighted. The technical framework which follows comprises technical constraints, the theoretical framework for consideration of technical change as well as the need for technical change in smallholder agriculture.

2.2 Defining a smallholder farmer in South Africa

The distinctiveness of the agricultural sector in South Africa implies that clarity regarding the definition of smallholder farmer cannot be ignored. The scenario in many other countries is that of farm size ranging from subsistence (small) to agribusiness type (large) (Kirsten and Van Zyl, 1998, p.563). South African agriculture consist of two major categories of farmers namely large-scale commercial farmers and small-scale farmers producing at subsistence level and found mainly in the “*former homelands*” of the country (Ortmann and King, 2006).

However, despite the clear-cut categories of farmers in South Africa, there is no consensus regarding the definition of a “small farm”. Kirsten and Van Zyl (1998, p.561) dispute the fallacies vis-à-vis value laden approach in defining smallholder farmers such that smallholder farming is viewed in the negative sense. There is often a negative perception of smallholder farming being associated with black farmers in the former

homelands who are non-productive, non-commercial and who lack the ability to be commercial farmers (Ministry for Agriculture and Land Affairs, 1998; Kirsten and Van Zyl, 1998, p.563).

Kirsten and Van Zyl (1998, p.563) dismiss land size as a good measure of distinguishing small farms from larger commercial farms. Indeed, it is true because one hectare of irrigated land appropriate for herb gardening can have profit potential equal to or higher than 500ha of low quality land in the Karoo (Kirsten and Van Zyl, 1998, p.563). In some cases, a typical farm may grow crops on a smaller portion of the land and leave the larger portion fallow due to shortage of complementary inputs, for instance (Huang, 1973). Again, there is a modernity illusion that an efficient farm is the one equipped with modern technology such as combine harvesters, tractors and other complex machinery (Kirsten and Van Zyl, 1998, p.563). In this respect small farmers are in danger of being incorrectly declared as less efficient or inefficient (Kistern and Van Zyl, 1998, p.563).

The commercial viability assessment of smallholder farming is also another area of disagreement when sampling farmers for research/development purposes. For instance, researchers are often confronted with multiple categories such as emerging farmers, subsistence farmers in the homelands, black farmers, small-scale white farmers, previously disadvantaged farmers, farmers on small pieces of land or farmers with a small turnover (Kistern and Van Zyl, 1998, p.563). The extent to which objective criteria can be developed to distinguish these categories or whether they are interchangeable remains a major challenge for sampling. Given this portrait, great care must be taken on choosing the correct group. Considering the above background information, in this study, a working definition of a small scale farmer according to Kirsten and Van Zyl (1998, p.564) is:

“... one whose scale of operation is too small to attract the provision of the services he/she needs to be able to significantly increase his/her productivity”.

2.3 Characteristic of smallholder agricultural sector

According to Oettle *et al* (1998), the smallholder farming sector in South Africa is very diverse and difficult to define, but involves mainly black households, producing on relatively small plots of land, with limited resources for household subsistence or sale. Schultz (1964), as cited by Ruttan (2002a), argues that smallholder farmers in most parts of the world, especially developing nations, are “*rational allocators of available resources*” but have limited technical and economic opportunities. As a consequence, these farmers remain “*poor but efficient*” (Ruttan, 2002a). In addition, Pauw (2005) noted that due to poverty, smallholder farmers often struggle to support themselves with meager income from agricultural activities. Hence, they rely on other sources of income such as wage remittances and pensions as well as government transfers or non-agricultural labour income. The Millennium Project Hunger Task Force (2004) asserts that smallholder agriculture is the main source of food for the rural population as well as an income generating occupation because it is the main activity for many rural parts developing countries. This implies that smallholder agricultural productivity is very crucial in alleviating poverty and hunger. In recognising this potential role of smallholder farmers, it is necessary to have a deeper insight into their key characteristics especially regarding their technological status, location, production objectives and factor intensity.

2.3.1 Low level of production technology

The smallholder farm sector of South Africa is characterised by rudimentary production technology (Limpopo Department of Agriculture, 2008). Kalibwani (2005) argues that smallholder farmers in Southern Africa mainly use traditional production techniques and productivity levels are often low. Given this condition, a narrow production base often characterise smallholder farming (Kalibwani, 2005). The rudimentary technology status can be explained by the fact that the sector is also labour intensive with minimal usage of machinery (Ministry for Agriculture and Land Affairs, 1998; Cousins, 2005).

2.3.2 Subsistence

Production in smallholder farming is mainly for subsistence purposes and to a lesser extent marketable surplus (Limpopo Department of Agriculture, 2008). Cousins (2005) also confirm this characteristic by asserting that output from smallholder farming for some rural households constitutes a greater proportion of their total livelihoods. Given this picture, production in smallholder farming is mainly to meet household subsistence/survival needs. In fact, it is because of such low production levels that there are calls by researchers and policy makers alike, for smallholder farmers to produce beyond subsistence in order to meet national food security goals (South African Social Investment Exchange, 2007; Kalibwani, 2005; Department of Agriculture, 2002; Bonti-Ankomah, 2001).

2.3.3 Location

Smallholder farmers in South Africa are characterised by their unique location. Smallholder farms are mainly located in the “*former homelands*” or “*Bantustans*” of South Africa. There were ten such homelands and self-governing territories, namely Bophuthatswana, Ciskei, Transkei, Gazankulu, KaNgwane, KwaNdebele, KwaZulu, Lebowa, Qwaqwa and Venda (World Statesmen, 2000). These areas were once self-governing territories which were established as part of the apartheid policy (Percival and Homer-Dixon, 1995). They only ceased to exist as self-governing territories on the 27th of April 1994 with the inception of democratic rule in the country. To date most smallholder farmers are located in these areas which have now been incorporated into South Africa (World Statesmen, 2001).

Smallholder farmers who are mainly blacks, were reportedly dispossessed of their original land during apartheid rule and some were resettled to the “*former homelands*” (Nel and Davies, 1999). The apartheid policies such as the Group Areas Act of 1956 resulted in land imbalances as allocation was done along race lines (Obi, 2006). An imbalance in land distribution was especially noted when the white minority were allocated 87 percent of agricultural land whereas the black majority (more than 70

percent of the total population) subsisted on the remaining 13 percent of the land (Percival and Homer-Dixon, 1995). In such circumstances, land scarcity is high especially when the population density for black settlement areas was ten times that of whites under apartheid era (Percival and Homer-Dixon, 1995). The living conditions are further worsened by the fact that most of the “*bantustans*” communities are located in areas which are marginally productive and prone to environmental deterioration (Percival and Homer-Dixon, 1995). Some of those areas are close to river valleys and hillsides (fragile environments) (Percival and Homer-Dixon, 1995). Given this background information, it is clear that those smallholder farmers operate in areas with environmental limitations.

2.3.4 Factor intensity

The smallholder agriculture in South Africa is characterised by intensive use of labour which is mainly derived from family members (Ministry for Agriculture and Land Affairs, 1998; Dorward, 1999). In this case, there is limited usage of external inputs such as machinery and fertilizers (Cousins, 2005). Dyer (1996), as cited by Dorward (1999), argues that intensive use of labour in smallholder farming is in some cases a form of self-exploitation arising from the fact that the majority are poor hence cannot afford external farm inputs. Unlike in larger commercial farms, costs of labour are too high for smallholder farmers in general, hence they have to do with family labour (Dorward, 1999).

2.4 Importance of smallholder agriculture

The significance of smallholder agriculture sector is recognised in the light of its contribution to the welfare of smallholder farmers through poverty alleviation, food security, employment among other related factors at a local, regional or international level. Some of the potential contributions of smallholder agriculture are reviewed in the next several sub-sections.

2.4.1 Poverty alleviation

There is no doubt about the potential role of smallholder agriculture in alleviating poverty. Currently, smallholder farmers in Southern Africa produce food for subsistence (Kalibwani, 2005). Taking into consideration that smallholders produce crops for their own livelihood, SASIX (2007) and Kalibwani (2005) argue that smallholder farmers have the potential to produce marketable surpluses. Machethe (2004) noted that smallholder agriculture is capable of alleviating poverty in three ways, namely: increased food supply, employment creation and increased farm income. Increased food supply provides producers with greater possibilities (even if it depresses unit prices) and affords consumers more choices at reasonable prices. According to Machethe (2004), 65 percent of poverty in South Africa is rural. On the basis that the majority of rural people are engaged in agricultural production, improvement in the smallholder farm sector increases the chances of poverty alleviation (Machethe, 2004). However, such an objective can only be attained with a vibrant smallholder farm sector (Machethe, 2004).

As part of the Millennium Development Goals (MDGs), the Millennium Project Hunger Task Force (2004) noted that it is conditionally feasible to decrease the proportion of hungry people by half by 2015. This can be done by raising agricultural productivity in smallholder farms. Improving functioning of markets is viewed as the key to solving hunger problems. It is generally agreed that such interventions are only viable if policy changes create an enabling context and remove constraints to progress (Millennium Project Hunger Task Force, 2004). There are many new farm technologies which are appropriate for marginal and less favoured areas that have inadequate infrastructure and modern inputs (The Millennium Project Hunger Task Force, 2004). For instance, the introduction of GMO (genetic modified organisms) technologies that increase crop tolerance to drought tends to benefit the agro-pastoral and rainfed cropping system (Ruben, Kuyvenhoven and Hazell, 2003).

2.4.2 Promotion of food security

There is powerful evidence of food insecurity in South Africa. Several organisations and scholars confirm the prevalence of food insecurity (Bonti-Ankomah, 2001; Department of Agriculture, 2002; SASIX, 2007). Mgijima (1999), as cited Bonti-Ankomah (2001), noted that 39 percent of the South African population is vulnerable to food insecurity. In addition, 22 percent of South African children under the age of nine suffer chronic malnutrition (Bonti-Ankomah, 2001). SASIX (2007) noted that food insecurity in South Africa is not a result of a non-performing commercial farm sector. Instead more attention is required in strengthening the smallholder farm sector through removal of technical, institutional and entrepreneurial constraints. As such, SASIX (2007) recognize the role of the smallholder farm sector in achieving food security through increased production and productivity. Given the large number of farmers in the smallholder sector, it is crucial to develop the sector (Machethe, 2004).

2.4.3 Employment creation

The smallholder farm sector has been recognised as an important sector in employment creation in South Africa. Delgado (1998), as cited by Machethe (2004), argues that:

“Smallholder agriculture is simply too important to employment, human welfare, and political stability in Sub-Saharan Africa to be either ignored or treated as just another small adjusting sector of a market economy”

Nationally, the smallholder farm sector provides employment to at least one million households (Ministry for Agriculture and Land Affairs, 1998). At provincial level, in Limpopo province for instance, smallholder agriculture has been noted to be contributing 25% of the jobs for the economically active population (Limpopo Department of Agriculture, 2008). This implies that where there is active participation in agriculture, there is more gainful employment. In contrast, very little employment is created when agriculture constitutes a smaller proportion to peoples' livelihoods. Such is the case in two rural areas of Eastern Cape Province, namely Guquka and Koloni (Monde, 2003).

2.5 Constraints to smallholder agriculture

There are several constraints to smallholder agricultural sector in South Africa. Due to historical imbalances, South African smallholder farmers are mainly constrained by technical and institutional factors such as shortage of farm equipment, inadequate property rights, inappropriate transportation infrastructure, high transaction costs among others (Nel and Davies, 1999). Other constraints affecting smallholder farmers but which shall not be discussed in detail in this study involve environmental and entrepreneurial factors (Department of Agriculture, 2001). The technological environment under which farmers operate is complemented by institutions together with markets and policy reforms (World Bank, 2004). Indeed, there is a close link between institutions and science and technology (Hassan, 2002). This entails that institutional limitations must also be taken into consideration when analysing technical constraints affecting farmers. *(One examiner gave you an option but you ignored it)*

2.5.1 Technical constraints

Taking cognisance of the assertion by Schultz (1964), as cited by Ruttan (2002a), that smallholder farmers often lack the technical and economic opportunity, it is crucial to examine the technical constraints affecting smallholder farmers as is shown in this section. Technical constraints to smallholder agriculture are numerous and include the following: absence of equipment to relieve labor shortages, inadequate supply of complementary inputs (such as seeds, chemicals and water), insufficient human capital, and inappropriate transportation infrastructure among others (Feder *et al.*, 1985). In South Africa, smallholder farmers are confronted by limited access to the above mentioned inputs as well as production and marketing information (Lyne, 1996).

One of the challenges facing farmers at an international level is that of diminishing marginal returns of yields when applying inorganic fertiliser (Ruttan, 2002a). Globally, crop yields are falling despite increases in fertilizer application (Tilman, Cassman, Matson, Naylor and Polasky, 2002; Ruttan, 2002a). This is explained by the declining

efficiency of fertilizer at higher levels of addition (Tilman *et al.*, 2002). To date, only less than 50 percent and 45 percent nitrogen and phosphorus fertilizer respectively is used by crops (Tilman *et al.*, 2002). The impact is more severe on smallholder farmers because of their small scale of operation.

Smallholder farmers are also challenged by inability to effectively control pests and diseases (Ruttan, 2002a). According to Upton (2002), technologies for disease control and cure for most developing nations are already known but the problem is delivery. Budgetary constraints have resulted in most government veterinary departments being constrained in controlling critical diseases (Upton, 2002). In crop farming, trying to increase crop production in most instances is threatened by the inability to control resistant pests – a problem worsened by increased international travels and trade (Ruttan, 2005).

With regard to technology, there is need to develop a body of knowledge that can be used to develop technologies which are specific to poor country agricultural conditions. However, as early as 1960s, it had become clear that much of agricultural technology is “location specific”, hence it is not easily transferable from one geographical location to the next (Ruttan, 2002a). In addition, technological adoption also depends on the level of interaction between the farmer and adopters through social networks (Hogset, 2005).

2.5.2 Institutional constraints

It is crucial to define institutions in order to correctly distinguish them from other related constraints. According to North (1994), institutions are

“The rules of the game: the humanly devised constraints that structure human interaction. They are made up of formal constraints (such as rules, laws, constitutions), informal constraints (such as norms of behaviour, conventions, self-imposed codes of conduct), and their enforcement characteristics.”

Institutionally, smallholder farmers in South Africa are currently constrained by inadequate property rights and high transaction costs (Lyne, 1996; Matungul, Lyne and

Ortmann, 2001). It is believed that the level of the transaction costs depends on the type and workings of institutions. Indeed, efforts to ensure legal rights to land for smallholder farmers have been made but with little or no progress. For instance, the Extension of Security of Tenure Act (ESTA), No. 62 of 1997 saw farm workers working on white owned commercial farms being given a proper legal status to remain on the land (Hall, Kleinbooi and Mvambo, 2001). Nevertheless, evictions of farm workers from white owned land have been on the rise despite the existence of section 23 of the Act which makes a breach of ESTA a criminal offence (Hall *et al.*, 2001).

At organisational level, efforts to assist smallholder farmers have not yielded much of the desired results. Research institutes, such as the South African Agricultural Research Council (ARC), have not been able to cater for the needs of the majority of smallholder farmers (Eicher and Rukuni, 1996). According to Eicher and Rukuni (1996), even though South Africa has an established research institute namely, the Agricultural Research Council (ARC), with 1400 scientists and a research budget of US\$66 million, this research institute is facing a crisis of serving the needs of all nine provinces.

2.6 Technical change and smallholder agriculture

This section reviews literature that explains the induced innovation model reflecting on how technical change and relative factor price influence the path of technological development in agriculture (Ellis, 1988). In this regard Ellis (1988), defines a technique as:

“...any single production method, i.e. it is a precise combination of inputs used to produce a given output.” and technical change as: *“...a reduction in the quantity of resources required to produce a given output...”*

In this regard technical “*inputs*” comprise farm implements and technical knowledge/information, farm infrastructure and complementary inputs such as seeds and fertiliser (Gebremedhin, 1993; Urech, 2000). Benefits of technical change as well as issues to do with promoting global science and technology capacity are also highlighted in this section.

2.6.1 Induced innovation model

Hayami and Ruttan (1971) stress the need for a shift from an “industrial fundamentalism” to agricultural growth and productivity as a foundation to economic development. Ruttan (2002b) says technical change in agriculture was viewed by many development theorists (Lewis, 1954; Rostow, 1956; Hirschman, 1961; Ranis and Fei, 1961) as exogenous to development of agriculture. Agricultural production growth was regarded as a pre-condition for growth in the rest of the economy (Ruttan, 2002b). However, the process by which agricultural growth was to come about remained outside the concern of the development theorists (Ruttan, 2002b). As a consequence, the interaction between the industrial and agricultural sector was not really modeled (Ranis, 2004). One of the outcomes of the view that agriculture provides resources to develop the industrial sector was labour reallocation from agriculture to industrial sector (Ranis, 2004). It was expected that the agricultural sector had surplus labour which if transferred to industrial sector would facilitate economic growth through re-investment of profits. In this case, Ranis (2004) asserts that labour transfer was possibly a result of investment in industry by agricultural capitalists which would mean additional employment opportunities. The labour supply will be “unlimited” because at a given wage rate, the number of people willing to work will be greater than demand.

Hayami and Ruttan (1971) view technical and institutional change as endogenous to the development process. Technical change is the key to agricultural production and productivity from the very beginning of the development process. The resource endowments and economic environment which a country finds itself in at the beginning of the modernisation process determine the path and process of technical change (Ellis, 1988).

In order to clarify the development process, Hayami and Ruttan (1971) explained how technical and institutional changes come about. In this regard, the “induced innovation” theory suggests the process by which public sector investment in agricultural research, the adaptation and diffusion of agricultural technology and the institutional infrastructure that is supportive of agricultural development are employed in order to relieve the

agricultural production constraints (Hayami and Ruttan, 1971). The implication of the “induced innovation” theory is that the development of new technology and institutional structures should be stimulated by the prevailing problem within the agricultural sector.

2.6.1.1 Induced innovation in the public sector

Although there is no theory of induced innovation in the public sector, public sector research has represented a major source of technical innovation in agriculture (Stevens and Jabara, 1988, p.146). The innovation inducement mechanism is based on both the response by research scientists and administrators in public institutions to resource endowment and economic change. Hayami and Ruttan (1971) therefore hypothesise that:

- the price efficiently reflects changes in the demand and supply of products and factors
- there exists effective interactions among farmers, public research institutions and private agricultural supply firms

In the first hypothesis, if the demand for agricultural products increases, the price of the inputs for which the supply is inelastic will rise relative to the prices of the inputs for which the supply is elastic and vice versa. Consequently, technical innovations that save the factors characterised by an inelastic supply become relatively more profitable for agricultural producers. Farmers are therefore induced by the shifts in relative prices to look for technical alternatives (Hayami and Ruttan, 1971).

In the second hypothesis, the dialectical interaction among farmers and research scientists and administrators is likely to be in operation if farmers form farmers associations at local and regional levels. The response of the public sector research and extension to the needs of the society is likely to be more effective with a decentralized research system. Tichenor (1969), as cited by Hayami and Ruttan (1971), says this is the case with United States of America where agricultural experiment stations in different states compete against one another. It would therefore be sensible to hypothesize that those scientists and administrators of public sector research programmes do respond to the needs of society.

2.6.1.2 Institutional innovation

The theory of “*induced innovation*” in this case is extended to explain the behaviour of public institutions, thereby representing an essential link in the construction of a theory of induced development (Hayami and Ruttan, 1971). They hypothesized the following:

- Scarcity of production factors resulting in change in relative factor prices *induces* innovative activities in both private and public research institutions
- It is possible to *induce* institutions governing technological innovations to offer technical opportunities to both individuals and the society under favourable market conditions

Hayami and Ruttan (1971) cited Timmer (1969) who saw as an example of institutional innovation, the issuance of the second Enclosure Bill in England to the extent that it facilitated the transformation of communal pasture and farmlands into single private farm units thus encouraging the introduction of an integrated crop-livestock ‘new husbandry’ system.

2.6.2 An operational model of induced innovation in agriculture

The model considers the capacity of an agricultural sector to adapt to a new set of factor and product prices. This adaptation involves the innovation to a new production surface as well as change along a fixed production surface (Ellis, 1988). For instance, when the price of fertiliser decreases relative to land, its increased usage is useless unless a responsive new seed variety is developed as a complementary input (Ellis, 1988).

Figure 2.1 presents an illustration of the induced innovation model. Suppose factor X is land and factor Y is fertiliser and the farmer is operating at point A on isoquant U_0 . Suppose the price of land (factor X) rises relative to the variable inputs like fertilizer (factor Y). The change in the factor price *induces* research and development into land saving technology (Ellis, 1988; Jaffe, Newell, and Stavins, 2001). The outcome of research is an inward shift to innovation possibility curve II, an envelope to all possible alternative isoquants (U_1 and U_2 are the other two alternatives as shown on Figure 2.1).

The relative shortage of land *induces* high yielding varieties which can produce more output per unit of scarce land (Ellis, 1988). Therefore changes or differences in resource endowments influence the types of technologies and institutions used in agriculture.

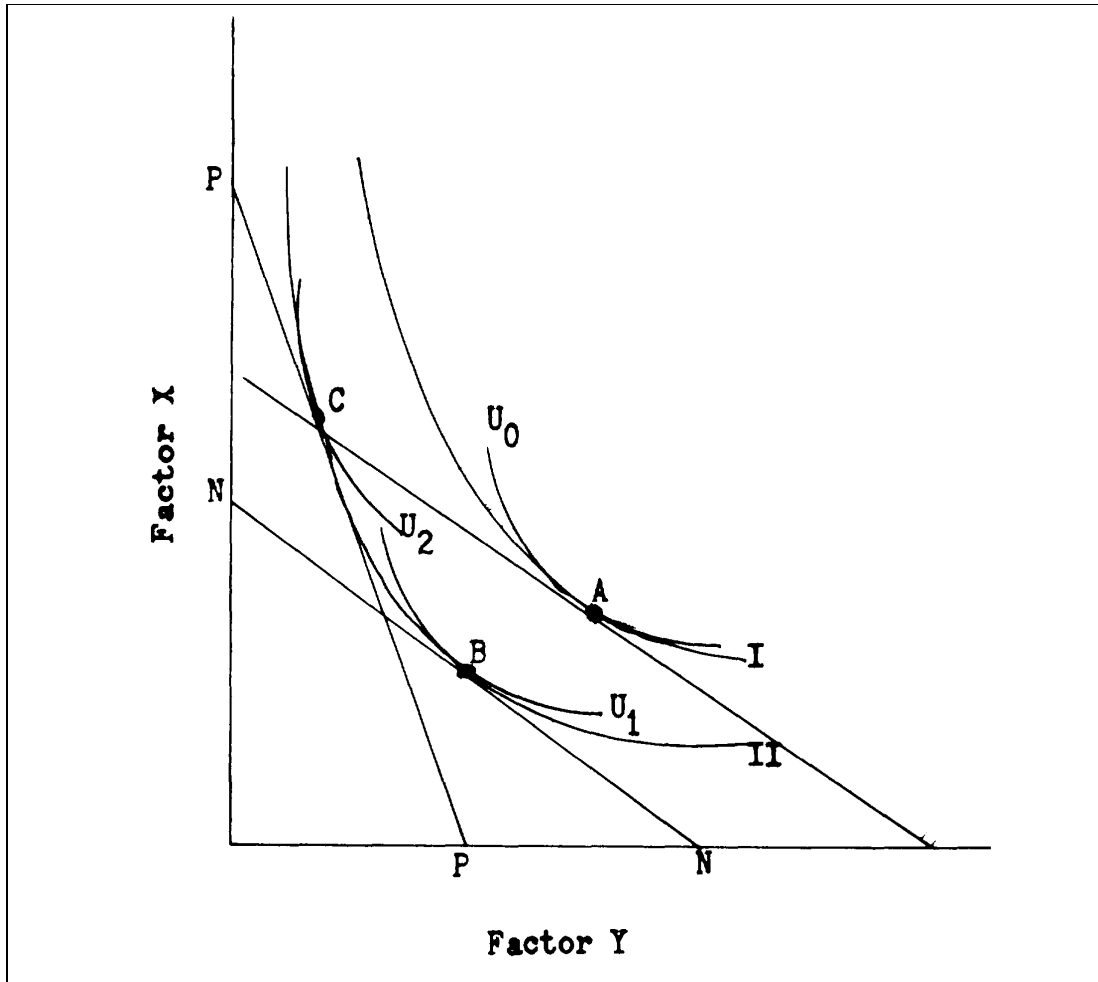


Figure 2.1: Induced innovation model. Adapted from Grabowski (1979)

According to Hayami and Ruttan (1971), the induced innovation model is aimed at elucidating the path of the technological development in terms of changing relative factor scarcities over time. Consequently, agricultural firms are induced to search for resource conserving production methods in a situation where a particular resource has become scarce and expensive. The following assumptions by Ellis (1988) explain this idea:

- The cost of agricultural resources rises overtime relative to other resources

- The scarcity of resources varies from one region to another according to land availability, population density and economic growth.

The second assumption of population growth and land availability can be used to explain two major paths of technological development in agriculture (Ellis, 1988). Where labour is a scarce resource, farmers seek labour-saving innovations to increase output which induces the manufacturing sector to produce labour-saving machines. The opposite is correct for a land scarce economy (Ellis, 1988). In this respect, technical change is endogenous because it is induced by changes in relative factor prices (Ellis, 1988).

2.7 Promotion of global science and technology capacity

Given the fact that smallholder farmers in Third World countries are technologically constrained, there is an urgent need to promote global science and technical capacity. Technical progress is often viewed in the light of science and technology (IAC REPORT, 2004). However, it is also important to critically analyse the sort of technical change required to improve smallholder agriculture as well as the controversies surrounding technical change.

There is need for developing science and technology (S&T) in developing nations for the following reasons:

- The world is changing at a rapid pace, driven by science and technology.
- Business-as-usual will leave an ever-growing gap between 'have' and 'have-not' nations.
- Local S&T capacity is essential in contributing to the world's valuable store of knowledge.
- The culture and values of science are critical for building a global community.
- Investments in science and technology are increasingly important for economic growth.
- Building capacity in agriculture, engineering, health, and the social sciences is essential for national development.

- Investments in science and technology are increasingly important for economic growth (IAC REPORT, 2004).

At the global level, many innovations have not benefited those who need them most—developing countries in particular (IAC REPORT, 2004). In fact S&T lagging countries (developing countries) continue to fall behind the advanced nations (IAC REPORT, 2004). One of the reasons why Third World countries fail to benefit much from S&T is that some of the structures of their academic institutions do not meet the 21st century challenges. Furthermore, it would be an illusion to assume that the rest of the world would benefit by solely leaving scientific and technological breakthrough in the hands of advanced nations (IAC REPORT, 2004). In line with the foregoing, in some instances, advanced nations produce technologies which are specific to their locations but not applicable to developing nations (Haggblade, Kirsten, Mkandawire and Devries, 2004).

Taking cognizance of the fact that many developing countries are technologically behind the advanced nations, it is urgent to establish the necessary framework for S&T (World Bank, 2004). The argument for such a notion is that S&T bring imagination and vision, hence positively affect the society in which they operate by alleviating poverty and hunger (IAC REPORT, 2004). The tools involved in science and technological breakthrough are often sophisticated, hence local knowledge and the ability to adapt to change is essentially the work of academic and research institutions in the Third World countries (IAC REPORT, 2004). Byerlee (1987, p10) views education as instrumental in increasing farmers' technical skills as well as “... *allocative ability in adapting new technology to their own needs and adjusting to changes in the environment.*” It is therefore critical that farmers acquire knowledge if they are to boost productivity and competitiveness.

2.8 Benefits of technical change

Despite technical constraints which characterise the smallholder farm sector in developing countries, there have been success stories of technical change. Howard, Rubey and Crawford (2000) assert that a key question which remains is how

advancements in technology, technology environment and coordination can contribute to broad-based economic growth, toward the creation of an economic cake that is not only increasing in size, but benefits a large part of the population. According to Howard *et al* (2000), one of the key areas for improvement is strengthening smallholder organisations. This section reviews the literature on the benefits of technical change in terms of production, livelihood, food security, and efficiency.

2.8.1. Increased production

Wiggins (2000, p.634), noted some positive results in the production of food crops in Sub-Saharan Africa. Wiggins (2000, p.634), identified and referred to micro evidence from a series of achievements from 26 villages across Sub-Saharan Africa as “*small and not so small booms in production of food crops for the national and sub-national markets*”. The increased food production was a result of collective action by a large array of actors, including farmers, non-governmental organisations, donors, researchers and governments (Wiggins, 2000, p.634).

In Bangladesh where rice is grown on a large proportion of cultivated land, yield increases from the early 1980s have been largely attributed to improved or modern varieties as well as introduction of shallow tube well (STW) irrigation (Bose, Chowdry, Hossain and Lewis, 2003). This has helped small-scale farmers who readily accepted and adopted modern varieties (Bose *et al*, 2003).

Farrelly (1996) noted another success story in poultry production in Bangladesh where the existing smallholder production was improved through the provision of vaccinations by government trained vaccinators, improved genetic stocks, feed supplements to complement scavenging as well as improved protection of birds against predators.

2.8.2 Source of income

As from the 1960s, cotton production in the West African region has been on the increase at an annual rate of 6.5 percent due to improved varieties (Haggblade, Hazell, Kirsten and Mkandawire, 2003). Such production increases made the region the world's third largest cotton exporting block after the USA and the former Soviet Union (Haggblade *et al.*, 2003). Tefft (2003) noted that the allied research institutes situated across the Sahel region have produced five of the six improved varieties of cotton responsible for productivity increases in Mali. Given the background regarding exports, cotton production certainly played an important role in generating foreign currency in this region.

Poverty alleviation in some rural parts of the world has arguably been a result of technical change (Ruttan, 2002a). In another case, increased production of cassava made it a major income booster for the majority of smallholder farmers. Nweke, Spencer and Lynam (2002), describing cassava as Africa's "*poverty fighter*" and second most important food crop, says the crop has improved many lives across West, Central and Southern Africa. Its "transformation" in Nigeria and Ghana from a traditional, famine reserve crop to a high-yielding cash crop underlines its importance (Nweke, 2004).

2.8.3 Food Security

The introduction of high-yielding varieties of maize in Africa saw the transformation of a minor crop to an important crop as it became a major source of calories to millions of people on the continent (Haggblade *et al.*, 2003). The introduction of Maize SR52 (improved variety) in Zimbabwe (then Southern Rhodesia) in 1961 increased the country's food security due to enhanced productivity (Eicher and Byerlee, 1997). This variety was later exported to surrounding countries such as Malawi and Zambia where it also improved the food situation (Eicher and Byerlee, 1997).

For centuries, farmers in the Great Lakes region of the Central African highlands have been experimenting with imported bananas and to date they have managed to develop a wide range of varieties, presently accounting for over one-fourth of calorie consumption for the 60 million inhabitants of the region (Haggblade *et al.*, 2003). Therefore, bananas have become an important crop in Central Africa.

2.8.4 Efficiency

There is no doubt that technological advancement contributes to increased productivity. According to Ruttan (2000a), growth in total factor productivity emanating from technical change has made significant contribution to economic growth. Higher levels of productivity in the United States of America (USA) have been a result of public and private sector investment into new technologies (US Department of Agriculture, 2002). In Thailand the adoption of improved technologies became the driving force in the production of low cost poultry. Consequently, farm level production costs were drastically reduced by decreasing the growth time and conversion ratio (Farrelly, 1996). As such, investment in agricultural research and development for technological and institutional development is crucial to production efficiency (US Department of Agriculture, 2002).

2.9 Controversies surrounding technical change

Ruttan (2002a) noted the controversy surrounding the introduction of the high yielding varieties of wheat, maize and rice in the 1960s. Critics say the technology was biased against the poor (IFPRI, 2005). The most frequently cited reasons are that the poor who are normally smallholder farmers have no access to new information and financial capacity to adopt technology as compared to large farmers (IFPRI, 2005). Larger farmers are in a position to use their profits to finance technology and increase production and productivity.

The introduction of genetically modified organisms (GMOs) to enhance agricultural productivity has become a controversial issue on the international arena with questions regarding food safety and environmental impacts being raised (Ruttan 2002a). Most likely, when there is controversy regarding use of technology, there is uncertainty regarding its usage (Ruttan 2002a). The decision to utilize such technologies will be based on whether one is risk averse or a risk taker (Ruttan 2002a).

However, what is certain is, when technology is lacking, the results in most cases are negative. Howard, Jeje, Tschirley, Strasberg, Crawford and Weber (1998) noted smallholders' lack of knowledge about technologically improved inputs in Mozambique as one of the causes for low productivity. Apparently, lack of stable, reliable sources of feed in the poultry sectors of Sub-Saharan Africa is one of the most frequently cited constraints. In Malawi, inconsistent availability of raw material and uneven distribution of commercial feed have been noted. Farrelly (1996) therefore cites technological innovation as one of the important factors over which the Sub-Saharan Africa poultry sector is developed.

All in all, there are several changes happening from the traditional self-sufficiency to a scenario whereby farm output has to respond to market trends. These changes, which include grading system, standards for food quality and safety and adoption of contracts, are to be taken into account by farmers if they are to survive in the farming business (Van Roekel *et al.*, 2002). The commercialisation processes are only feasible by overcoming constraints to production and market access (Pingali *et al.*, 2005).

CHAPTER 3

AGRICULTURAL MARKETING IN SOUTH AFRICA

3.1 Introduction

This chapter reviews the extent to which agricultural markets operate in South Africa. The existence of agricultural markets in South Africa cannot be explained in isolation. In this regard, this chapter begins with the agricultural history, country profile and overview of the agricultural sector. A review of how markets in South Africa evolved shall follow. Thereafter, there is an evaluation of the policy framework and policy failure reflecting on some of the agricultural policies formulated to date and their shortcomings. Taking cognisance of the globalisation of markets, an agri-supply chain is presented to shed light on current modern market requirements. A snapshot review of the theoretical framework outlining the different circumstances under which producers fail to access markets is provided. The central focus of the chapter is a review of the implication of technical constraints to market access and this is discussed in some detail. Lastly, a review of agricultural markets is presented in terms of their importance, promotion and factors influencing access to them.

3.2 History of agriculture in South Africa

South African agriculture has a history of state involvement with regard to access to natural resources, markets, and finance (Kirsten, Van Zyl and Van Rooyen, 1994). Decisions taken by the state have had a lopsided impact on different farmer categories for the greater part of the period since the founding of the Union of South Africa in 1910 (Vink and Kirsten, 2000). Perhaps, to date, one of the known impacts is the highly skewed distribution of land ownership (Vink and Kirsten, 2000). Vink and Kirsten (2000) described the complex political, social and economic interactions that prevailed within the South African agricultural sector in four epochs:

- *1910 to the Second World War:* This can be described as the period of segregation of agriculture and support of the white farmers. Laws, legislations and farm policies explaining the current discrimination in land access were enacted and consolidated during this era. The most significant ones are the Land Bank Act of 1912, the Land Settlement Act of 1912, the 1913 Land Act and the legislation to launch the wine farmers co-operative. Prior to World War II, more Acts were passed which include: the Co-operative Societies Acts of 1922 and 1939, the Natives Administration Act of 1927, the Land Act of 1936 and the Marketing Act of 1937.
- *End of the Second World War to 1980:* The impact of apartheid and poor economic policies such as the replication of marketing control were felt during this period despite growth of the South African economy. Agriculture was negatively affected by increases in the inflation rate in the early 1970s as well as a wide range of farm specific policies to the extent that there was need for urgent reformulation of policies by early 1980s. The new policies which were enacted in the 1980s aggravated the dualism of the agricultural economy and internal barriers to trade in farm commodities through replication of marketing controls. All in all there was institutional duplication such that there were 14 agricultural departments by 1984. However, this was a phase of promotion of agricultural mechanization and increased pressure on the former homelands to produce food.
- *1980s to the democratic elections in 1994:* This was the period of removal of discriminatory policies and increased liberalization of agriculture. The objective of the policies during this period was to achieve production, marketing and other general goals such as food self-sufficiency. For instance, the policy stated in the White Paper on Agricultural Policy (RSA, 1984: 8-9) focused on achieving economic, social and political development through optimal use of factors of production. However, this was a period of political and economic instability and economic sanctions in mid-1980s.
- *Post 1994 to the present:* Agriculture was deregulated in response to globalisation. Due to market liberalisation, most of the protective policies of agriculture were removed and new Acts such as the Marketing of Agricultural

Products Act (1996) were promulgated. In this era, legislative and policy changes to correct past inequalities were also enacted. However, nothing much has changed in terms of land redistribution from the rich to the poor (Vink, Kirsten and Van Zyl., 2000). The land redistribution target is that 30 percent of previously white-owned land be transferred to blacks by 2014. To date 14 years into the programme and with six years to go, just about 5 percent or less have been transferred. In fact, the effects of the past agricultural policies still affect many rural poor people (Vink *et al.*, 2000). Unequal land ownership still characterises the agricultural sector in South Africa (Vink *et al.*, 2000).

3.3 Country profile

A brief profile of South Africa's geographical location, population characteristics, economy, inequality and poverty is reviewed in this sub-section. Firstly, a description of the country's geographical location shall be presented. Secondly, population characteristics showing different races and their proportions are described. Thirdly, an overview of South Africa's economic foundation and its achievement is highlighted. Lastly, a brief discussion of current events regarding disparities between the rich and the poor is provided.

3.3.1 Location

The Republic of South Africa is situated on the southern tip of the African continent (22° - 35°S, 16° - 32°E) (Standard Bank, 2007). The country can be regarded geographically as one of the largest countries on the African continent with a surface area of 1.2 million square kilometers (World Bank, 2007). As shown in Figure 3.1, South Africa borders Namibia in the Northwest, Botswana and Zimbabwe in the North Mozambique and Swaziland in the Northeast, and encloses the landlocked country of Lesotho (World Bank, 2007).



Figure 3.1: Map of South Africa

3.3.2 Population

CIA World Factbook (2008) reports a population of 43.9 million (estimates for July 2007). This population basically comprises four ethnic groups: Black Africans (79 percent), White (9.6 percent), Coloured (8.9 percent) and Indian/Asian (2.5 percent). Recently, a negative annual population growth rate of -0.46 percent (2007 estimates) has been noted. The population is also characterised by a low life expectancy of 42.45 years (2007 estimates). Lower population growth in South Africa is mainly attributed to the

HIV/AIDS pandemic (CIA World Factbook, 2008). This can be confirmed by an estimated figure of 5.3 million people living with AIDS in 2003 (CIA World Factbook, 2008).

3.3.3 Economy overview

South Africa has Africa's most prosperous economy boasting of 40 percent and 45 percent of continental industrial output and mineral production, respectively (World Bank, 2007). South Africa produces more than half of Africa's electricity. Its Gross Domestic Product (GDP) constituting around 25 percent of continental GDP and four times more than its southern African neighbours makes it the one of the best performing economies in Africa (World Bank, 2007). The World Bank (2007) reported Gross National Income (GNI) of US\$234.7 billion. Its economic foundation is consolidated by the physical and economic infrastructure, growing manufacturing sector especially value-added manufacturing, mineral resources, tourism growth potential and growth in service industries (World Bank, 2007).

Since 1999, South Africa has experienced the longest economic expansion in its history, a feature which is seemingly not coming to an end (South African Reserve Bank, 2005). For the period from September 1999 to June 2005, the annual average economic growth rate has been 3.5 percent, a significant increase as compared to the decade prior to 1994 when the annual average growth rate was less than one percent (World Bank, 2007).

3.3.4 Inequality and poverty

Despite positive economic trends, South Africa has been marred by the paradox of ever increasing disparities between the rich and the poor (Oettle *et al.*, 1998). One of the assumptions of laissez-faire economics of the new millennium is that when markets are deregulated, the new wealth created "*trickles down*" to the poor (Brown-Luthango, 2006). In South Africa, the "*trickle down*" effect on the poor has not been fruitful in

terms of bridging the gap between the rich and poor (Brown-Luthango, 2006). Seemingly, it served to perpetuate poverty and inequality as the number of poor people “surviving” on less than US\$1 has risen from 9.4 percent of national population in 1995 to 10.5 percent in 2002 (Brown-Luthango, 2006). A net increase of 735 627 of informal dwellers has been recorded for the period from 1996 to 2001. Landlessness still characterise the post-apartheid South Africa as the majority of the poor are still without land (Percival and Homer-Dixon, 1995). To date, the effects of the 1913 Land Act which resulted in inequitable land distribution remains more or less practically unchanged since far less than 5 percent of land has been redistributed to landless people.

3.4 Overview of agriculture in South Africa

South African has an agricultural sector characterised by dualism as two sub-sectors are distinctly noted (Ortmann and King, 2006). There is the commercial sub-sector mainly dominated by white farmers who use sophisticated machinery to produce large amounts of specialised commodities with value addition in some cases. On the other hand is the less specialised communal farming sub-sector dominated by black citizens, producing lesser quantities using less sophisticated machinery (Groenewald *et al.*, 2003, p.1). The situation in the latter case is a manifestation of the legacy of the apartheid regime’s discriminatory policies (Groenewald *et al.*, 2003, p.1). Consequently, disparities between the rich and the poor are prevalent as evidenced by unequal distribution of: income (Pauw, 2005), land, economic assets, support services among others (Oettle *et al.*, 1998).

Only 13 percent of the 1.2 million square kilometers can be used for crop production out of which only 22 percent is high potential arable land (Laker, 2005). The uneven rainfall distribution across the country, with some areas susceptible to drought negatively affects the viability of crop farming (Department of Land Affairs and Department of Agriculture, 2005). There are diverse climatic regions ranging from Mediterranean to subtropical to semi-desert.

However, despite the foregoing portrait, South Africa is one of the best performing agricultural sectors on the African continent and possibly in the world (Department of Agriculture, 2006). It is not only self-sufficient in almost all major agricultural products but also a net exporter of wool, wine, citrus, sugar, maize and fruit juice and some deciduous fruits (Department of Land Affairs and Department of Agriculture, 2005). For the period from 2000 to 2005, agriculture constituted about 8 percent of total exports. The country produces products ranging from deciduous, citrus and subtropical fruit to grain, wool, cut flower, livestock and game from a wide range of activities, from intensive crop production and mixed farming to cattle ranging and sheep farming (Department of Land Affairs and Department of Agriculture, 2005). Such production is an outcome of agricultural development such as improved irrigation systems. In this regard, about 1.3 million hectares of land is under irrigation (Department of Land Affairs and Department of Agriculture, 2005). However, agriculture contributes less than 4 percent of the Gross Domestic Product (GDP) but accounting for 10 percent of total reported employment (OECD, 2006).

3.5 History of agricultural marketing in South Africa

The Marketing Act of 1937 had until the 1980s been regulating agricultural marketing in South Africa (Groenewald *et al.*, 2003, p.7; Kirsten *et al.*, 1994). The Act meant provisions of assured markets and guaranteed prices, since marketing was done via control boards that monopolized the marketing process (Department of Land Affairs and Department of Agriculture, 2005; National Department of Agriculture Directorate: Marketing, 2005; Groenewald *et al.*, 2003, p.7). The consequence of this marketing system was a disincentive for farmers to acquire marketing skills due to lack of need to do so. In line with the preceding, the monopolistic stance taken by control boards resulted in lack of competitiveness on the part of farmers (Groenewald *et al.*, 2003, p.7).

In 1997, the South African government introduced policies which transformed South African agricultural markets from regulated and protected status to that of a free market dispensation, a move in response to globalisation of markets (Department of Agriculture

and Land Affairs, 2007; National Department of Agriculture Directorate: Marketing, 2005; Groenewald *et al.*, 2003, p.7). In line with the foregoing, the Marketing of Agricultural Products Act, No. 47 of 1996 was formulated to ensure enhanced market access, efficiency, and boost foreign earnings through creation of a deregulated market environment (National Department of Agriculture Directorate: Marketing, 2005; Ministry for Agriculture and Land Affairs, 1998). The Act also enables the registration and information collection on the part of farmers (Ministry for Agriculture and Land Affairs, 1998). The outcome of deregulation of markets was the dismantling of all control boards, removal of price controls, and disappearance of a single marketing channel by 1998 (Ministry for Agriculture and Land Affairs, 1998). The immediate outcome of the deregulation process was the sudden exposure of farmers to a market environment where they were to make marketing decisions without proper skills and experience to do so (Groenewald *et al.*, 2003, p.7). The impact was even more pronounced on farmers in the former homelands who had previously been deprived of key means of production and could not develop modern marketing skills (Groenewald *et al.*, 2003, p.7). Despite low output due to lack of key means of production, the acquiring of marketing skills by smallholder farmers was still necessary. In this case, the ability to market (in lucrative markets) the few they produce would help to offload some of the constraints they face through re-investment. However, the absence of either improved production or access to market impacted negatively on smallholder farming. In addition, this group of farmers is characterised by low educational standards.

The market deregulation process saw a decrease in South Africa's market distortions. In this respect, South Africa's market distortion levels became more or less similar to those of countries with the lowest levels of distortions such as Australia and New Zealand (Ministry for Agriculture and Land Affairs, 1998). An increase in agricultural commodity exports in crops and animal production to a lesser degree has also been the outcome of market liberalisation. Greater market efficiencies have been achieved as and contributed to moderate food price inflation despite the difficult 1997-1998 season (Ministry for Agriculture and Land Affairs, 1998). The free market environment yielded positive

outcomes as evidenced by the increased entrance to the marketing value chain (National Department of Agriculture Directorate: Marketing, 2005).

However, as the National Department of Agriculture Directorate: Marketing (2005) put it “...there are still some obvious market access gaps created by either lack of access to marketing infrastructure, lack of access to marketing information and training, etc.” In this regard, smallholder farmers are in many instances confronted with lack of proper market outlets. For instance, in the case of fresh produce, long distance and/or lack of transport deprive resource poor farmers of formal market access (National Department of Agriculture Directorate: Marketing, 2005).

In both the pre- and post-deregulation era, smallholder farmers in South Africa have generally been deprived of both production and marketing facilities. Findings by the National Department of Agriculture Directorate: Marketing (2005) in 13 targeted rural development nodes under the South African Integrated Sustainable Rural Development Strategy (ISRDS) confirm the foregoing situation. In this regard, smallholder farmer development has been hindered by production of low quantity and quality products, lack of market information and inadequate or absence of marketing infrastructure (National Department of Agriculture Directorate: Marketing, 2005).

3.6 Agricultural policy framework

In the history of South Africa, many associations, unions, and cooperatives have been formed to assist its agricultural sector (Department of Agriculture and Land Affairs, 2007). Pre-1994, organisations such as the National Farmers Union (NAFU) (NAFU SA, 2005) and policy initiatives such Farmer Support Programme (FSP) had already been in existence (Department of Agriculture and Land Affairs, 2007). The Farmer Support Programme (FSP) was established in 1986, initially to transform subsistence agriculture to commercial agriculture by assisting emerging farmers in acquiring land, finances, technical knowledge and farming machinery in South Africa’s seven provinces except KwaZulu – Natal and Western Cape (Agricultural Research Council, 2007). The

objective of FSP later changed towards promoting economic development by improving the welfare of farmers (Kirsten, Sartorius von Bach & van Zyl, 1993). NAFU was established in 1991 to assist resource poor black farmers who were excluded from mainstream agriculture through support services and capacity building programmes (NAFU SA, 2005). Agri South Africa (Agri SA) is also one of the farmers' unions which was geared towards farmers' development. Agri SA, formed as early as 1904 asserts itself as the mouthpiece of as much as 70 000 large and small-scale commercial farmers in South Africa regarding their social and financial status (Agri SA, 2007). In 2005, Agri SA and NAFU jointly formed a taskforce called the Farmer Development Trust (FDT) whose goal was to help ensure agricultural productivity and profitability amongst black farmers (Agri SA, 2005).

After 1994, the new democratic government set up a number of initiatives to assist black South African citizens who were disadvantaged by apartheid. Although, the deregulation process meant in short, reduction in state support regarding marketing of agricultural products, it does not mean that farmers were completely neglected. There was continual and preferential support of smallholder farmers by the government. One of the outcomes of deregulation was the closure of agricultural marketing boards. Subsequently, the National Agricultural Marketing Council (NAMC) was set up in 1997 and the Directorate: Marketing in the Department of Agriculture established in 2002 were to collaborate in resolving agricultural marketing matters (Department of Agriculture and Land Affairs, 2007). However, between the period 1997 and 2002, the Strategic Plan for South African Agriculture was adopted in 2001 to ensure sustainable resource management, global competitiveness and profitability as well as equitable access and participation in agriculture by all South Africans (Department of Agriculture and Land Affairs, 2007). In the same year (2001), the Land Redistribution for Agricultural Development (LRAD) programme was established to help the black South African population to acquire land for agricultural production purposes (Department of Land Affairs and Department of Agriculture, 2005).

Agricultural Black Economic Empowerment (AgriBEE) was established in 2004 to assist South African black resource poor farmers to participate fully throughout the entire value chain in the agricultural sector (Department of Agriculture, 2004). The Broad-Based Black Economic Empowerment (BBBEE) Act 53 of 2003 was passed in 2003 to empower all blacks (women, youth, workers, and the disabled inclusive) through an integrated socio-economic approach (Department of Agriculture, 2004; Government Gazette, 2004). The Comprehensive Agricultural Support Programme (CASP) launched in 2004, like other initiatives, sounded equally promising as it focuses on improving on on-and-off farm infrastructure, financial and technical assistance and marketing related support systems (Department of Agriculture, 2004).

3.7 Policy failure to agricultural development

Taking into consideration the mentioned initiatives which in many instances were geared towards uplifting the welfare of black farmers formerly subjected to racial segregation, the question is: why then is the legacy of apartheid in this sub-sector of agriculture persisting? There is no shortage of literature pointing out the deteriorating 'condition' of smallholder agriculture whose effects are susceptibility to food insecurity and household food poverty (South African Social Investment Exchange, 2007; Machethe, 2004; Department of Agriculture, 2002; Food Security Working Group, 1997). In line with the above-mentioned scenario, the South African Social Investment Exchange (SASIX) (2007) reports an estimate of 14.3 million South Africans being vulnerable to food insecurity and malnutrition, of which the majority are in provinces characterised by large rural populations (KwaZulu-Natal, Northern Province, Eastern Cape and the Free State are the case in point).

There is substantial evidence that the current smallholder farmer situation is by no means getting better. For instance, from 1994 to 2000 there has been an increase in the poverty rate. According to the CIA World Fact Book (2008), 50 percent of South Africans were below poverty line in 2000. There has been a decline in consumption rate to less than 1% per capita per annum during the same period (Department of Land Affairs and

Department of Agriculture, 2005). The period 1995 to 2002 witnessed a rise in the unemployment rate from 15.9% to 30.5% (DBSA, 2005). By 2003, the UN's Human Development Report for South Africa was predicting South Africa's unemployment rate to be ranging from 25% to over 40% (UNDP, 2003).

3.8 Agri-supply chain management

Studies reveal that, unlike during the era of regulated markets, it has become indispensable for modern day farmers to comprehend the ongoing activities within the supply chain structure (Groenewald *et al.*, 2003, p.129; Van Roekel *et al* 2002). Reference to the dynamics surrounding the modern supply chain requirement becomes crucial in understanding smallholder farmer constraints in relation to market access. In this regard, it is important to be aware of the following trends, namely: changing consumer demand in terms of taste, health, safety and sustainability (Van Roekel *et al* 2002). Figure 3.1 shows the current market driving forces in agriculture that characterise the modern supply chain namely: supply chain differentiation, integral chain care and chain optimisation.

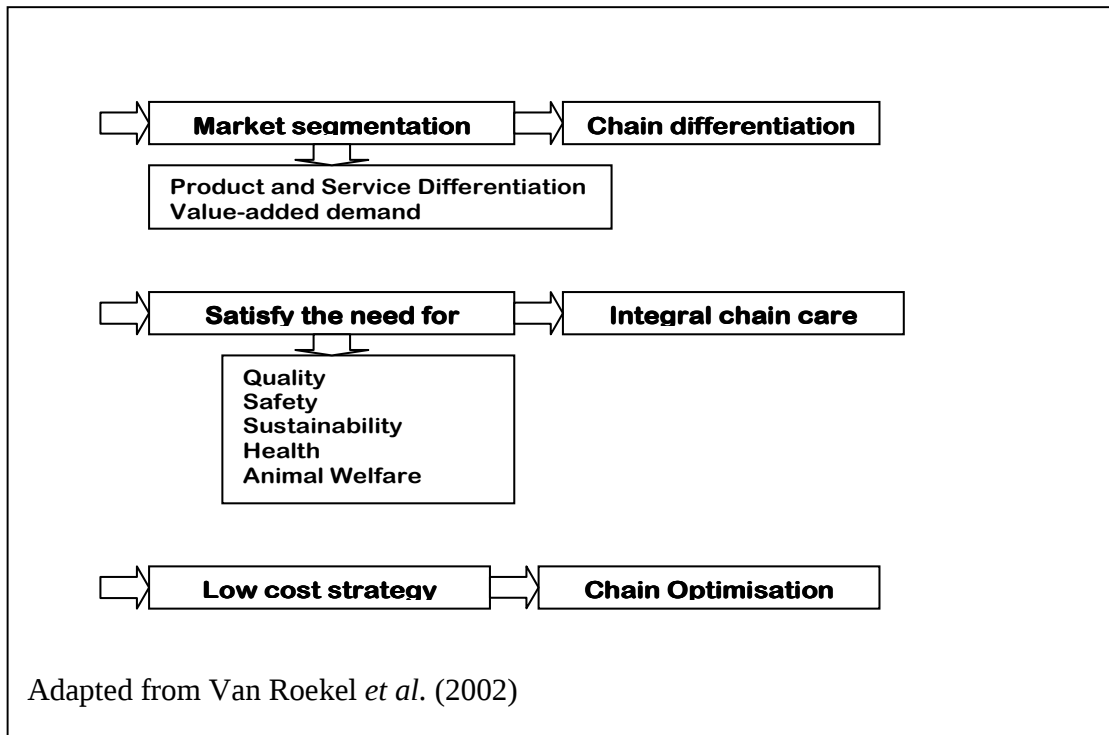


Figure 3.1: Current market driving forces for agricultural products.

Value addition has become an important aspect in the marketing of agricultural products. The change in lifestyle especially in western countries challenges chain collaborators to consider value addition to their products and consider specific requirements for a given market segment through chain differentiation (Groenewald *et al.*, 2003, p.129; Van Roekel *et al.*, 2002). Issues regarding health and safety of agricultural products are the driving forces behind consumer choices, hence demand the need for the emergence of an integral chain care and quality guarantee (Groenewald *et al.*, 2003, p.129). In addition, care for the environment must be exercised such that the future benefits are not compromised through unsustainable production practices (Van Roekel *et al.*, 2002). Whilst the need to differentiate the supply chain and integral chain care must be taken into consideration, it is crucial to optimise the entire supply chain. According to Van Roekel *et al.* (2002), optimisation of the supply chain is one of the ways of coping with increasing global competition. In this regard, the process involves, for instance, the ability to decrease transaction costs (Van Roekel *et al.*, 2002).

Groenewald *et al* (2003, p.129) also noted other drivers of change which are world-wide deregulation of agriculture, technological advances such as production technology and information and communication technology (ICT), and the changing supply structure of agriculture. The implication of the latter relates to uncertainty and higher price risk involved vis-à-vis food quality detection problems.

According to Groenewald *et al* (2003, p.130), supply chain management is:

“...the collaboration among actors in a supply system, from the primary producer to the final retailer, to better satisfy consumer wants and needs at lower costs.”

The implication of this definition implies that there is a linkage among supply chain actors. Good supply chain management brings efficiency and effectiveness in the production, processing and distribution of food and agricultural products process to consumers (Groenewald *et al.*, 2003, p.130; Boehlje, 1999). Properly managed supply chains also result in competitiveness amongst supply chain actors (Boehlje, 1999). Figure 3.2 shows a simplified supply chain and its critical dimensions. In this case, the supply chain linkages begin from biotechnology to the retailers and its critical dimensions consist of governance, incentives, information and financial flow.

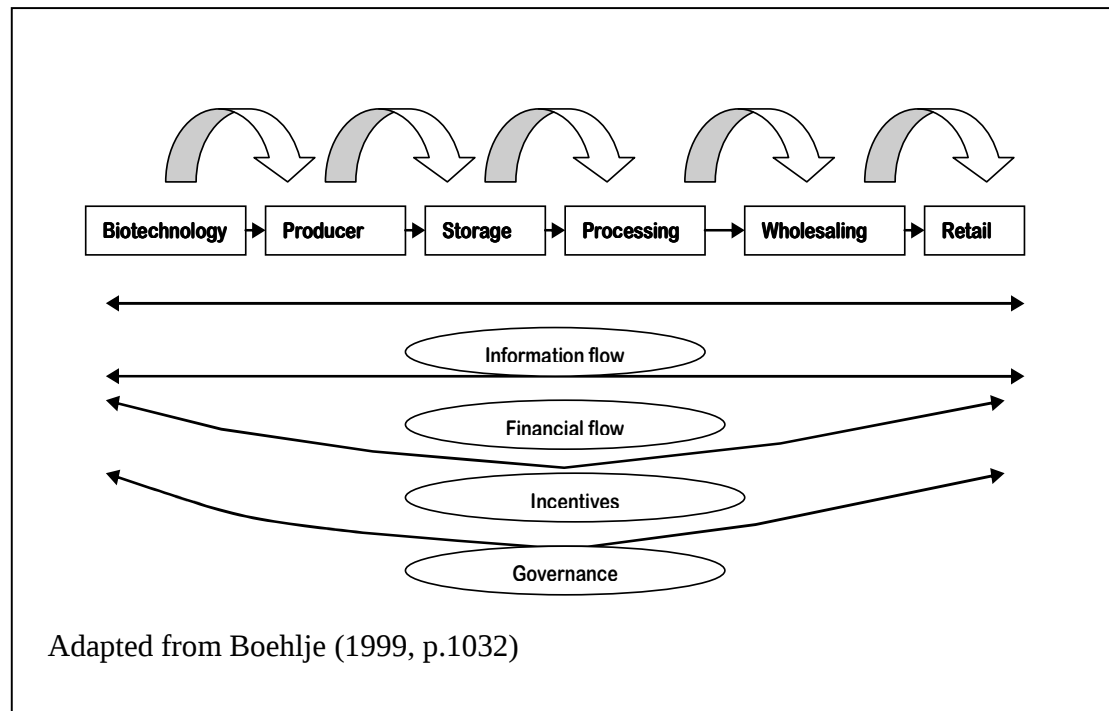


Figure 3.2: Critical dimension of a supply chain

As shown in Figure 3.2, the supply chain comprises inter-related links through which a given agricultural product flows. It begins from the biotechnologist whose role is to create varieties (inputs) best suited for producers. The products produced by the producer are stored and eventually processed before being transported in bulk to the wholesalers. It is the retailer, after breaking the bulk (from wholesalers), who delivers the product to the final consumer.

There are basically six critical dimensions to consider in supply chain management viability. Specifically, the first dimension is product *processes and activities* until it reaches the final consumer. The second dimension, *product flow*, relates to transportation and logistics involved throughout the entire supply chain. The third dimension, *financial flow*, involves inter-chain sharing of financial performance information. The fourth dimension involves *information flow*, the communication among supply chain actors. With *information flow*, traceability of products for quality and safety assurances is possible. The fifth dimension is *incentives*. *Incentives* involve rewarding performance to

various participants in the chain. *Governance/co-ordination* system is the final dimension which describes the various arrangements facilitating supply chain entrance, such as open market access, contractual agreement and vertical ownership (Boehlje, 1999, p.1032).

3.9 Theoretical framework for market access

Due to market liberalization and its associated benefits such as greater market efficiencies, there is no doubt that the South African marketing environment presents lucrative opportunities for different farming enterprises. Indeed, if markets are not properly explored and the requirements met, such opportunities remain elusive to most farmers. When there is information asymmetry, lack of infrastructure, lack of credit facilities and high transaction costs among others, smallholders are susceptible to different types of market imperfections. Ahmed, *et al* (2005) identified eight different types of market imperfections which farmers in developing regions of the world are likely to encounter which can be evaluated against perfect competition characteristics. The perfectly competitive market characteristics are homogeneous products, many buyers and sellers, market transparency and freedom of entry or exit. According to Ahmed, *et al* (2005), different types of market imperfections are:

- *Missing markets*: this refers to an extreme case of market failure. There is no access to market for a particular commodity produced. Such a failure does not reflect absence of a market but rather it can be household specific which can relate to high transaction costs. In this case, a market will be relatively “*missing*” to a particular household. Institutional problems such as high transaction costs compound this condition.
- *Thin markets*: Might be a result of inadequate demand or supply. In such cases, there is often a failure to attain economies of scale. This market imperfection can be traced to high transaction costs, information asymmetry, and a weak institutional framework as the main factors. In this regard both market development and market access are repressed, hence thin markets.

- *Incomplete markets:* Emanates from an “*incomplete*” market environment which more often than not is traced to information asymmetry. The implication in this case, an unobservable action which negatively impacts on another party is carried out by one party. Therefore, one party can have an unfair advantage over another in a transaction.
- *Shallow local markets:* There is oversupply or scarcity of a commodity on the local market leading to low or higher prices, respectively. This condition can be caused by poor infrastructure resulting in high transport costs such that supply of the commodity to (in the case of oversupply) or from (in the case of scarcity) other regions are prohibited.
- *Interlocked markets:* Is a monopoly type of market resulting from a linkage in input and output markets such that a creditor for instance is the sole supplier of inputs and buyer of output. Shortage of similar creditors promotes the circumstances.
- *Distorted markets:* Certain interventions in the market alter the normal functioning of the market. Intervention by the government through usage of taxes, tariffs and subsidies may discourage competition. Reference to infant industry argument (i.e. protection of local industry) is often cited under such circumstance.
- *Well-functioning markets but with imperfect competition:* these can be monopoly (one seller), oligopoly (few sellers/buyers), and monopolistic competition (not many but considerable sellers) which leads to various market inefficiencies.
- *Markets with almost perfect competition:* The deviation from completely attaining the characteristics of perfect competition varies with conditions. Markets signaling a “*workable*” or “*contestable*” competition are products of an almost perfect competition. In the former, competition is “almost” perfect except that there might be for instance small barriers to entry or exit. In the latter, the

potential competition on the market controls monopolistic behaviour of the existing firms.

3.10 Implication of the technical constraints for market access

In most cases, whenever farmers are technologically constrained, there are high chances that they have problems with accessing the market as well (Bahiigwa, 2006). The literature was reviewed in relation to this aspect to assess the evidence for the implications of technical constraints for market access. Constraints to accessing different types of markets by smallholder farmers shall also be presented. A contrasting example shall follow illustrating a success story regarding market access.

3.10.1 Market access

Pingali *et al* (2005) noted that smallholder farmers face two major situations. First is the ability to commercialise which often involves technical change. Second is the ability to choose a suitable enterprise at any given time and place. The inability to cope in both of the above mentioned cases makes it difficult for these smallholders to adapt to modern food marketing systems and consequently fail to enter the food markets (Pingali *et al.*, 2005). The commercialisation process today is focusing on agribusiness and its influence on the process of change (Pingali *et al.*, 2005). In countries with well-developed markets, there exists, to a larger extent the integration between producers and the output market, emphasis being placed on quality and safety standards (Groenewald *et al.*, 2003, p.129). On the other, hand production for the markets is dominated by the use of purchased technical inputs. In a situation where credit is missing, liquidity constrained farmers are likely to have difficulty in purchasing technical inputs and hiring labour (Bagamba, Burger, Ruben and Kuyvenhoven, 2005). Consequently, these farmers are forced into subsistence production which leaves them with no or limited surplus for the market (Bagamba *et al.*, 2005).

From research carried out by Cruz (2006) in Latin America, it has been found out that smallholder banana producers face the following market constraints: quality, logistics, finance and trade regulations. In line with the foregoing, fungal diseases in bananas constrained smallholder farmers in meeting the quality standards set by retailers and supermarkets which can be traced back to absence of technical inputs in solving the problem. In terms of sea transportation of bananas, producers in Latin America heavily depended on other peoples' vessels which might not be timeous given the perishability of the product. Such a constraint could be surmounted by individual or group ownership of the vessel by the producers. This problem has also been noted by Bagamba *et al* (2005) who found logistics combined with distance to market in Uganda to be one of the major constraints to market access. The implication here is that, with inadequate arrangements all aspects such as transportation from farm to the market place, farmers are likely to find it unprofitable to attempt to transport their produce to distant markets. Limited access to credit was found to be hindering infrastructural development whilst trading high tariff limited exports (Cruz, 2006). Therefore, with the above-mentioned constraints in place, it is very difficult to access the market for the produce.

Thorbecke (2000), as cited by Van Tilburg (2004), compared Sub-Saharan African (SSA) markets to Asian markets and found the unsatisfactory response of SSA agricultural markets to price changes. For instance, failure in “*getting prices right*” in SSA is often a result of lack of marketing infrastructure, research and institutions. Accordingly, there is lack of effective, efficient and impartial markets which subsequently became a disincentive to investment in agriculture and also widening the welfare gap between the smallholder and commercial farmers (Van Tilburg, 2004). In contrast, Asia has managed to develop its markets by, for instance, setting up marketing infrastructure (Van Tilburg, 2004).

3.10.2 Constraints to different types of markets

There are various constraints affecting different types of markets. These include technical, infrastructural and marketing constraints. This sub-section explains these

constraints in relation to different market types identified by Bahiigwa (2006) to be domestic, regional and international markets.

3.10.2.1 Domestic markets

From a research carried out in Eastern Africa, it has been found that there are several constraints affecting different types of domestic markets in Eastern Africa (Bahiigwa, 2006). Firstly, the high sales tax incidence on smaller quantities or units of farm output has often discouraged farmers from accessing rural/local markets even though they are nearby. Consequently, this has had a tendency of discouraging commercialization.

Secondly, there is a problem of accessing urban markets. This problem is traced back to logistical problems such that farmers are forced to use traders who transport in bulk to urban markets. In line with the foregoing, farmers are susceptible to poor transactions in the case of information asymmetry on their part (Bahiigwa, 2006). The other problem is that farmers may incur high transaction costs under such circumstances (Bahiigwa, 2006).

Thirdly, the supermarkets that in the past used to purchase high quality imports have recently (mid 1990s) opened doors to African farmers as well (Bahiigwa, 2006). In this regard, the opportunity offered by supermarkets presents alternative marketing outlets for many farmers if properly explored. However, with the prevailing structural, organisational and institutional constraints, smallholder farmers often fail to meet market requirements such as high quality and/or quantity product specifications or deliver their output on time (Cruz, 2006).

3.10.2.2 Regional markets

There is a wide range of obstacles to access to regional markets noted in the Eastern African Community (ECA). Farmers often suffer from infrastructural problems such as

roads, railways, telecommunications and electricity to enable them to access markets within their individual countries or across the region (Bahiigwa, 2006). Under such circumstances, farmers find it difficult to access markets outside their region especially when they are lucrative.

One of the obstacles facing farmers in ECA is lack of capital compounded by lack of access to credit. Lack of access to credit may impede farmers from meeting the farm production costs when they have no alternative sources of capital resources. In some cases, marketing costs such as trustworthy market information and enforcing contracts may require capital injection. (Bahiigwa, 2006). When credit is lacking under such circumstances, farmers encounter some difficulties in meeting the costs.

3.10.2.3 International markets

African farmers face several obstacles in attempting to access international markets, which range from domestic supply constraints to market entry barriers. Technical and institutional constraints such as production of poor quality products and tariff barriers respectively have been noted to be responsible for failure to guarantee market access (Bahiigwa, 2006).

Access constraints to international markets may come in the form of tariff barriers such as tariff peaks and tariff escalations (Cruz, 2006). Tariff escalations affect value added products for export by making them less competitive and reducing returns to investment. In such cases, investor confidence in such products is hampered and recourse is often made to unprocessed goods whose world demand is decreasing (Bahiigwa, 2006). For instance, the tariff rates for the European Union (EU) in 2002 were pegged at 0 percent on import of cocoa beans (raw material), 9.6 percent for cocoa paste (semi-processed), 25 percent for processed chocolate and 29 percent for cocoa powder (International Monetary Fund (IMF), 2002). Such trends encourage the exportation of an unprocessed product by cocoa producing West African countries with the exception of Ghana and Ivory Coast

who benefited from EU's *Everything But Arms* initiative (International Monetary Fund, 2002).

Secondly, non-tariff barriers which take the form of technical standards and sanitary and phytosanitary (SPS) measures pose a greater threat than most barriers (Orden, Lofgren and Gabre-Madhin, 2004). Certain product standards limit farmers from developing countries from exporting their products to developed countries. To worsen the situation, more stringent standards have been put in place over the years – from below 25 in the early 1980s to over 400 by 1999 (Bahiigwa, 2006).

Thirdly, agricultural support policies such as subsidization by developed country governments have often stimulated supply on the world market thus decreasing market prices. Consequently, Third World producers who generally do not get such government support suffer the consequence as their products are out-competed. For instance, subsidies by the United States of America to its cotton producers result in loss of export revenue to West African cotton producers (Orden *et al*, 2004; Alston, Sumner and Brunke, 2007). In this regard, the implication is that US farmers dominated the global cotton markets as they marketed their cotton at relatively low prices but without affecting their net revenues, unlike non-subsidised farmers.

Lastly, the control of the commodity value chains by multi-national companies is increasing. Under such circumstances, there is a decline in the final consumer price that is received by the producers who are not part of a multi-national value chain (Bahiigwa, 2006). The effects are more severe to smallholder farmers in Third World countries who in most instances are more likely to be excluded (Bahiigwa, 2006).

3.11 The importance of markets to smallholder farmers

There is no shortage of literature supporting the importance of market access to smallholder farmers and for alleviating/eradicating hunger and poverty through increased production and cash income generation (National Department of Agriculture Directorate:

Marketing, 2005; Ostertag, Lundy, Gottret, Best and Ferris, 2005; Magingxa and Kamara, 2003). Magingxa and Kamara (2003) noted cash crops having a key role in rural growth and livelihood enhancement. However, without proper access to profitable markets, smallholder farmers are likely to remain poor.

3.12 Promoting access to markets

Pingali *et al* (2005) argue that if only small farms overcome constraints related to production, they are capable of entering markets considering their productive efficiency. Introduction of incentives to produce cash crops such as tobacco has been found to be one of the beneficial ways which Third World policy makers can assist small farmers in accessing the market. With the injection of capital resources for instance, farmer are also capable of boosting surplus production of crops such as maize. The introduction of hybrid maize and tobacco in Malawi, which are capital intensive crops, benefited smallholder farmers both in terms of technology and market access. Maize and tobacco smallholder farmers benefited from the government policy of controlling output markets (Zeller, Diagne and Mataya, 1997). In the early 1990s, the government encouraged smallholder maize production by setting the producer price below import parity level. The setting the prices below import parity level gave farmers a competitive edge over the import rival products (Zeller *et al.*, 1997). The government increased the share of tobacco quota to smallholder farmers who form clubs (Zeller *et al.*, 1997). The members of the club in this case would have privileged access to extension, credit and inputs whilst receiving higher prices by directly selling to the auction floors (Zeller *et al.*, 1997). In addition, smallholder farmers (including non-club members) benefited from an intermediate buyer programme in which they were allowed to sell their tobacco as registered traders. Consequently, there has been an increase in the number of tobacco smallholder farmers (Zeller *et al.*, 1997).

3.13 Determinants of market access in South Africa

There are many technical factors which determine market accessibility in smallholder farming. This section reviews the literature on how different factors influence market access in smallholder farming. The factors include: quantity and quality of output, physical and marketing infrastructure, marketing information, asset ownership, good agricultural practices, contract farming, land tenure security, technical capacity, extension services, labour and skills, value addition and credit.

3.13.1 Quantity and quality of output

There is consensus amongst many scholars that lower grade of agricultural produce by smallholder farmers is a consequence of inadequate means of production and marketing infrastructure. The Agricultural Product Standards Act, 1990 (Act No. 119 of 1990) of South Africa calls for agricultural products and other related products to conform to certain standards regarding quality, packaging, marking and labeling if they are to be competitive at both domestic and international markets (Department of Agriculture and Land Affairs, 2007). As such, complementary production and marketing infrastructure should be available to farmers if mainstream markets are to be captured. An inter-municipal comparative study done by the Directorate: Marketing in South Africa, between farmers in Boland Municipality against those in Bohlabeledo, Zululand, Kalahari-Kgalahadi and Ukhahlamba rural municipalities portrays this picture. Farmers in Bohlabeledo, Zululand, Kalahari-Kgalahadi and Ukhahlamba Municipalities were more constrained by physical and institutional marketing infrastructure than in Boland Municipality where the facilities were well developed (National Department of Agriculture Directorate: Marketing, 2005). In line with the foregoing, conventional agricultural markets become inaccessible to the constrained farmers who instead resort to informal markets.

In many instances, even when lucrative markets exist, smallholder farmers in general often suffer from lack of profitable market opportunities when output is low. Increased production constraints often relates chiefly to physical resources and technical constraints

(National Department of Agriculture Directorate: Marketing, 2005). Groenewald *et al* (2003, p.8) takes cognizance of the fact that if economies of scale are missing in terms of produce, smallholder farmers are often in a weaker bargaining position on the market. The above mentioned inter-municipal comparative study also confirms this notion (National Department of Agriculture Directorate: Marketing, 2005). In this regard, due to lack of land tenure arrangements, capital and technical skills in Bohlabele, Zululand, Kalahari-Kgalahadi and Ukhahlamba Municipalities, farmers were unable to achieve increased production. The opposite is correct in Boland where advanced farming systems are put in place.

3.13.2 Marketing information

Acquiring information on product prices, price trends and market segments is one of the crucial objective of any farmer who intends to market his/her produce (Ministry for Agriculture and Land Affairs, 1998). Marketing information improves the bargaining power of producers especially when dealing with traders (Ministry for Agriculture and Land Affairs, 1998). However acquiring market information in South Africa, at the right time and place is often a characteristic of commercial farmers due to their ability to access websites, publications and commodity associations. On the contrary, resource poor farmer have to rely on government extension staff for market information in which case it might not be timely and convenient (Groenewald *et al.*, 2003, p.8).

3.13.3 Physical and market infrastructure

According to Ahmed and Donovan (1992, p.1), the term infrastructure means “...*public capital goods*” which are capable of carrying “...*the distinction of producing external economies (technological and pecuniary) and social benefits different from private benefits.*” Physical infrastructure include: irrigation, storage, roads, etc. (Narender, 2005; Machethe, 2004). Machethe (2004) asserts that development in agriculture is linked to provision of physical infrastructure since it positively influences productivity and profitability. Hence, lack of physical infrastructure becomes one of the prime injurious

constraints to agricultural development (Ostertag, Lundy, Gottret, Best and Ferris, 2005). In line with the preceding, lack of physical infrastructure constrains smallholder farmers from accessing the market both in terms of production, quantity and quality as well as accessibility to the market. The effect of missing/poor infrastructure manifests into high transaction costs which eventually lead to low market participation or recourse to other less profitable marketing arrangements such as direct sales to consumers (Machethe, 2004, Makhura, 2001, p.33).

Ahmed (1994, p.143) identified a significant number of different ways through which infrastructure positively impacts on agricultural production if well developed. The selling of modern agricultural inputs is logistically easier in areas with developed infrastructure hence modern technology usage can be significantly high. In that respect, farmers are said to be more receptive to new technology under such circumstances. Secondly, extension services are more accessible to farmers because extension officers find it more convenient to work in such places. Lastly, infrastructural development enhances efficiency in both factor and product markets.

Marketing infrastructure is crucial since it determines the storage and distribution of agricultural products. Whilst physical infrastructure can constitute marketing infrastructure, the latter specifically relates to transportation, processing and communication for marketing purposes (Machethe, 2004). There is no doubt that inadequacy or absence of infrastructure is detrimental to accessing the market and might result in farmers incurring high transaction costs (Machethe, 2004). For instance, a poorly developed road networks and inaccessibility has forced farmers in Bohlabele, Zululand, Kalahari-Kgalahadi and Ukhahlamba Municipalities of South Africa to sell their produce to local communities at uncompetitive prices. In contrast, farmers in Boland Municipality where transport and storage facilities are within reach have been able to access the output markets (National Department of Agriculture, 2005).

3.13.4 Asset ownership

Asset ownership such as a motor vehicle is regarded as one of the factors determining market participation. Barriers to market entry are reduced when farmers possess assets (Boughton, Mather, Barrett, Benfica, Abdula, Tschirley and Cunguara, 2006). This can be illustrated by for instance, vehicle ownership which can be used for transportation of farm inputs and outputs (Makhura, 2001, p.33). Contrary to the foregoing, lack of asset ownership can result in market exclusion (Boughton *et al.*, 2006; Makhura, 2001, p.33). From research carried out by Boughton *et al.* (2006) in Mozambique, it was concluded that the poorest smallholder farmers were unable to participate in remunerative agricultural markets due to lack of household-specific productive assets.

Asset ownership has also been found to be influencing output markets. The traditional collateral requirement by agricultural finance institutions is having title deeds to the land (Department of Agriculture, 1995). In a White Paper for Agriculture in 1995, the Department of Agriculture (1995) has discouraged land ownership as criterion for eligibility of credit. Instead, it has been suggested that credit should be given on the ability of the farmer to repay back the debt (Department of Agriculture, 1995). In this case, a wide range of options such as making use of non-farm income, family income, and other assets. Makhura (2001, p.24) asserts that asset ownership influences the ability of a farm to access credit markets. In this case, assets serve as collateral security in the event that the farmer fails to pay back the debt. MAFISA (2005) also regards assets to be collateral security when issuing out equipment loans to farmers.

3.13.5 Good agricultural practices

The agricultural supply chain management in South Africa takes into consideration food quality and safety practices and ensures that the procedures for inspection are followed (SAQA, 2007). This entails that farmers must sustainably produce quality and standardized products without harming the environment (SAQA, 2007). Ortmann (2002, p.126) noted that agriculture in South Africa is undergoing an industrialization process in

response to exposure to world markets. Thus, the agricultural supply chain must consider diverse consumer demands, food safety, health, nutritional issues, environmental concerns (Ortmann, 2002, p.126) and traceability (Ostertag, Lundy, Gottret, Best and Ferris, 2005) if they are to be globally competitive. With regard to environmental concerns, the Department of Agriculture (1995) asserts that issues regarding sustainability require special attention such that the dynamic farming systems are not only economically and scientifically sound but environmentally friendly. However, Ortmann (2002, p.126) asserts that the commercial farming sector is more capable of in meeting the abovementioned supply chain requirements than smallholder farming sector. In contrast, linkages to the mainstream agric-food supply chains by smallholder farming sector is a major challenge which can be traced back to lack of institutional innovation (Ortmann, 2002, p.126).

3.13.6 Institutional arrangements

Contracts in smallholder agriculture are a vehicle for providing assistance in new technology, ready markets secured inputs and prices (Kirsten and Sartorius, 2002). The existence of contracts in recent years has been further necessitated by agricultural industrialization and competitiveness within agri-supply chains. In line with the abovementioned, Reardon and Barrett (2000) noted the rise of cooperatives and contract farming in response to maintenance of food grades and standards. Thus, contracts play an integral role in quality management systems, especially on the part of producers.

However, there has been criticism that contract farming exploits the farmers when monopolistic tendencies arise, for instances when farmers lack diversification of production because they only supply one purchaser (Eaton and Shepherd, 2001). However, despite some irregularities in contract farming, Kirsten and Sartorius (2002, p.505), argue that

“...the changing nature of world agriculture provides a new set of reasons and objectives why contract farming could become an important institution for

empowering poor small-scale farmers in developing countries, as well as a ‘vehicle’ for providing access to more lucrative markets.”

Contracts in South Africa are widely inaccessible to smallholder farmers. Research carried out to understand the rules governing vegetable markets in South Africa in attempting to create opportunities for emerging farmers depicts this scenario (Qeqe and Cartwright, 2005). The declining role of municipal markets in compliance with market deregulation and the rise of preferential contract arrangements between large vegetable growers and major supermarkets made it difficult for small producers to enter these lucrative markets (Qeqe and Cartwright, 2005).

Nevertheless, acquiring a contract is just but one of the key factors in accessing the market. Qeqe and Cartwright (2005) have noted that opportunities still exist for smallholder farmers in informal spot markets such as formal markets, restaurants, corner shops, among others. Benefiting from such opportunities in this case is an outcome of creating trust of buyers through timely and consistent quality output supply.

3.13.7 Security of land tenure

There is no doubt that security of tenure is one of the most crucial factors determining farm development. Amani (2004) defines security of land tenure as the “...the right to use, transfer, exclude or include others in the exercise of such rights, as well as the authority to enforce the foregoing rights.” Land tenure security directly influences other farming factors such as the inclination and obligation towards resource conservation and improvement of the land (Amani, 2004). Thus, farmers who are land secure are willing to learn and take the essential measures which enhance production and productivity.

Amani (2004) further realises that government ownership of land in most developing countries is the source of land insecurity for most smallholder farmers who believe they possess the traditional right of ownership. Without title deeds, farmers find it difficult to develop the land and may lead to negligence of land conservation and sustainability. The climax of land insecurity may in some instances lead to civil conflict.

3.13.8 Technical capacity

Technical know-how and capacity facilitate the transformation of traditional agriculture to modern agriculture. Farmers who are equipped with technology (farm machinery and infrastructure), farming techniques and management skills are likely to realize enhanced production and productivity (Machethe, 2004; Amani, 2004). However, increased production and productivity can be a result of enhanced technical performance emanating from extension advisory services, workshop attendance, financial capacity, market access, and research and development.

Farm technology and techniques do not operate in isolation. Increased production and productivity do not only come about as a result of advanced machinery and farm equipment but also through timely inclusion of complementary inputs such as high yielding varieties and agro-chemicals (Amani, 2004). From research carried out at Nkandla in KwaZulu-Natal, failure to acquire inputs timeously has been cited as one of the major reasons for a smaller proportion of agricultural contribution to household income (Taylor and Cairns, 2001). This has been attributed to high expenses involved in purchasing these inputs (Taylor and Cairns, 2001).

3.13.9 Extension and other farmer support services

Many scholars recognize the significance of extension and other support services in achieving enhanced smallholder agriculture production and productivity (Machethe, 2004; Amani, 2004; Ministry for Agriculture and Land Affairs, 1998). According to Amani (2004), extension services play a crucial role by empowering farmers with farming techniques, knowledge and management skills. Furthermore, Umali and Schwartz (1994) assert that extension services assist farmers with information regarding agricultural inventions such as farm production technologies facilitating farm management, marketing and processing equipment. Machethe (2004) argues that growth in smallholder farming is elusive without support services. There is no doubt about the importance of extension services. This has been clearly demonstrated by Zimbabwean cotton and maize smallholder producers who doubled their production in the 1980s

(Rukuni and Eicher, 1994). This achievement has been attributed to extension complemented by finance and marketing services.

3.13.10 Labour and skills

Taking cognizance of the rudimentary state of farm implements and technology in most African countries, labour and skills in agriculture are regarded as crucial in ensuring increased production and productivity (Amani, 2004; Taylor and Cairns, 2001). Evidently, when labour and skills are in short supply, farming operations are hampered (Amani, 2004; Taylor and Cairns, 2001). This has been proven by research carried out at Nkandla in KwaZulu-Natal where labour shortages and skills have been cited as one of the major reasons for low return in agriculture (Taylor and Cairns, 2001). Amani (2004) regards the foregoing scenario as reflection of relatively low wages in agriculture than in other sectors of the economy. Naturally, there is therefore a tendency for labour, especially the active rural people, to migrate to non – agricultural sectors of the economy (Amani, 2004).

3.13.11 Value addition

Value addition refers to a series of activities which incorporate post-harvest handling, processing, packaging, transportation and marketing (Mrema and Rolle, 2002). Such activities offers lucrative income opportunities for farmers (Ostertag *et al.*, 2005; Qeqe & Cartwright, 2005; Groenewald *et al.*, 2003, p.129; Van Roekel *et al.*, 2002), off-farm employment and overall agricultural development and economic growth (Mrema and Rolle, 2002). In fact, it is regarded as one of the integral components of agri-supply chain management as food requirements especially in western countries are changing. In this view, consumers are now demanding, for instance, pre-cut, ready-to-eat-products among other wants and needs (Van Roekel *et al.*, 2002). Value addition has become an important input when considering different market segments (Van Roekel *et al.*, 2002). Unfortunately, for most developing countries, value addition is done off-farm due to lack of technical know-how and infrastructure, among other reasons (Ostertag *et al.*, 2005).

3.13.12 Credit

Credit is regarded as one of the crucial factors determining the availability of both production and marketing inputs. There is no shortage of literature to prove that credit plays an essential role for acquisition of capital goods (Ahmed *et al.*, 2005; Machethe, 2004; Blackman, 2001), land improvement (Amani, 2004), and to meet short term seasonal needs (Gouse, Kirsten, Jenkins, 2002; Amani, 2004). Generally, for many smallholder farmers in Africa, credit is elusive mainly because of absence of formal financial structures to finance smallholder farming (Amani, 2004). However, contrary to the former, the situation in South Africa is somewhat unique since there are many agricultural credit institutions. The South African government has established parastatal credit institutions with the mandate to provide credit in the *former homelands*. For instance, the establishment of the defunct Agricultural Credit Board, Land Bank, Agricultural Credit Scheme (Machethe, 2004), MAFISA (Department of Agriculture and Land Affairs, 2007), among other institutions, clearly paints this picture. However, shortcomings present themselves as a significant number of farmers find it difficult to access credit for reasons such as lack of collateral security.

According to Machethe (2004), some of the parastatal credit institutions have collapsed as a result of deregulation of agriculture. Such is the case with the Agricultural Credit Board which was terminated in 1997 and the Agricultural Credit Committees were disbanded the following year (Department of National Treasury, 1999). In this case the Land Bank was expected to fill the gap by providing credit to farmers (Machethe, 2004). Indeed, the Land Bank plays an important role in credit provision since it managed for instance to assist 15 000 black farmers in 2003. However, the Land Bank could not sufficiently provide credit to most farmers and this prompted the government to establish the Agricultural Credit Scheme (Machethe, 2004). The Agricultural Credit Scheme specialises in credit provision to small-scale farmers whilst the Land Bank caters mainly for the needs of commercial farmers. To date the Agricultural Credit Scheme finds it difficult to cope with a binary objective of ensuring market access to farmers whilst financially sustaining the scheme (Machethe, 2004).

CHAPTER 4

METHODOLOGY

4.1 Introduction

This chapter describes the research methodology for data collection and analysis for the study. A description of the background information to Nkonkobe municipality includes issues regarding history, agricultural potential, land tenure security, population, resources and economic activities. The data collection was implemented in two ways. General information on the institutional set-up was obtained by open-ended interviews of community leaders and focus groups. These interviews supplemented information obtained through a literature study. The other method of data collection employed was the single-visit household survey using structured questionnaires which covered a wide range of issues, including demographic information, costs and returns, marketing arrangements, and access within a broad definition. The resulting data were utilised for different levels of analysis. This study employs the logistic model to isolate key components of market access, including access to market/price information, productive inputs and infrastructure. Detailed descriptions of the study area and the data collection and analytical procedures are elaborated on in the sections that follow.

4.2 Nkonkobe Municipality

This section provides a general description of Nkonkobe Municipality in term of its geographic location, history, land issues, livelihoods, resources and agricultural potential. This study focused specifically on the Kat River Valley of the municipality where the majority of the small-scale and emerging farmers selected for the study are found. The description begins with the municipality's location, then the history, demographics, land issues, livelihoods, resources and agricultural potential in this sequence.

4.2.1 Geographic location of the study area

Nkonkobe Municipality is located in Eastern Cape, the second largest province of South Africa (Simpfiwe, 2001). The Nkonkobe Local Municipality falls under the Amatole District Municipality and covers the following towns: Alice, Fort Beaufort, Hogsback, Middledrift and Seymour as shown in Figure 4.1 (SA Routes, Bookings and Info Systems, 2005). The municipality is bordered by the following local municipalities: Nxuba, Lukanji, Amahlathi, Makana and Ngqushwa (Nkonkobe Municipality, 2007). The municipality which covers a relatively large area is named after a mountain range (Winterberg), Nkonkobe in isiXhosa (SA Routes, Bookings and Info Systems, 2005).

Kat River Valley, the focus of this study, is located northeast of Grahamstown in the former Ciskei in the foothills of the Amatole Mountains and Winterberg. The valley stretches for about 80 kilometers and its catchment area is about 1 715 square kilometers (Water Research Commission, 2006). Apart from Fort Beaufort and Seymour, there are several small towns and villages in the valley (Water Research Commission, 2003).

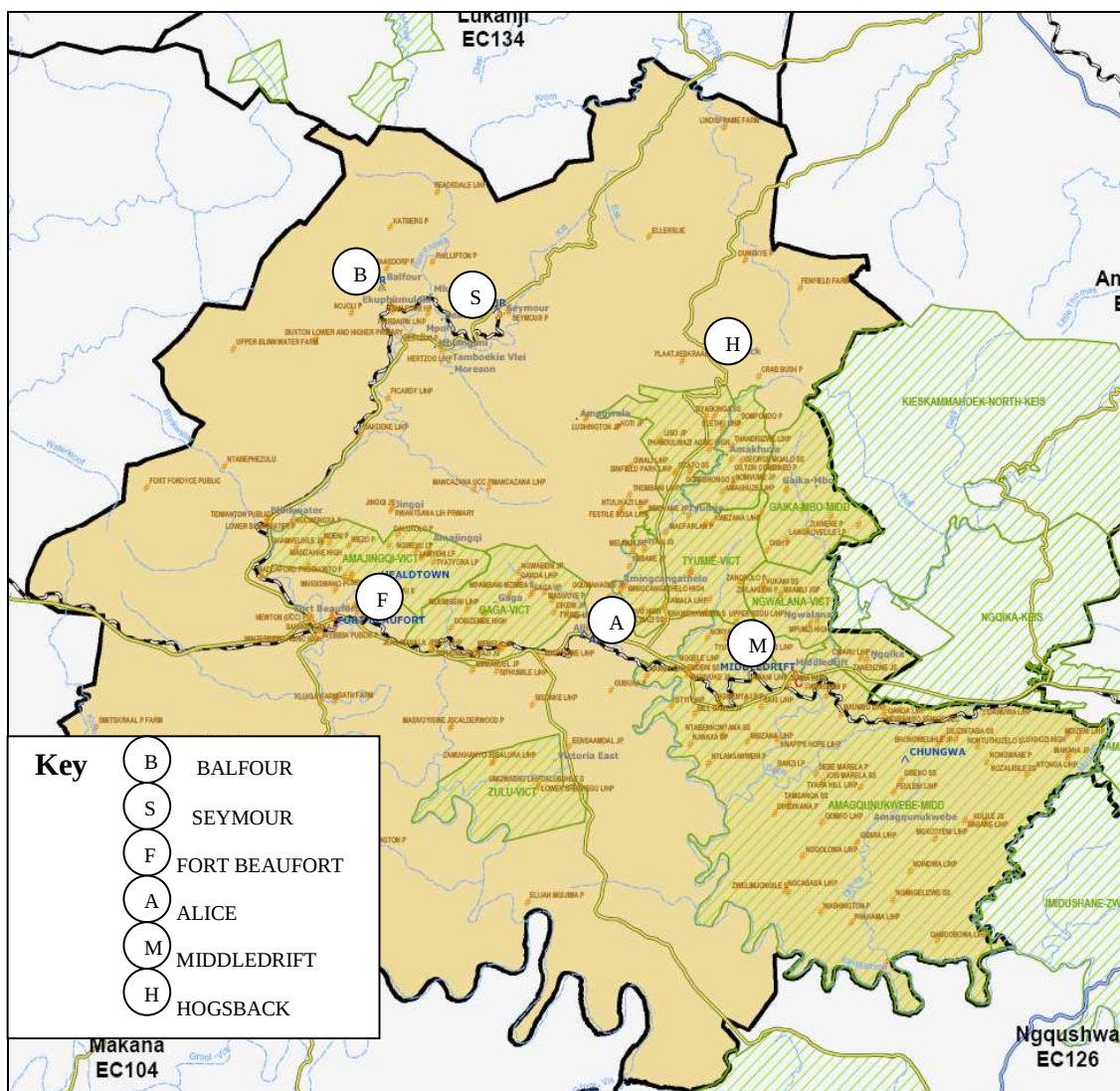


Figure 4.1: Map of Nkonkobe Local Municipality

4.2.2 History of Nkonkobe Municipality

The municipality falls in the zone of two historically conflicting races, which are the blacks and whites. The racial difference and conflict later manifested themselves in laws favouring whites to access key means of production whereas blacks were resettled in the former homeland reserves of Ciskei and Transkei with limited access to means of production (Nel and Davies, 1999). Ciskei and Transkei reserves come to be known as “homelands”. The formation of these two reserves for the resettlement of thousands of

people compounded differences, particularly in terms of the small size of landholdings allocated, increased rural densities and limited access to state support and infrastructure. Consequently, the former homelands are characterised by extreme overcrowding and frequent environmental collapse. Land appropriation and uneven development regarding service provision characterise the municipality.

Similar to the rest of Nkonkobe, Kat River Valley is an area with a history of contest disputes over command for economic resources. For decades, there has been a number of tribes involved in clashes regarding ownership of the valley resources and this includes the Khoi-Khoi, Xhosa, and white settlers (Water Research Commission, 2006). However, policies of the past and the present have had major impacts on to the inhabitants regarding the valley's resources. In this respect, the creation of the former homelands of Ciskei has further complicated the valley history. Historically, Kat River Valley development was hampered by poor land management practices and complex land tenure arrangements (Nkonkobe Municipality, 2004). Whilst some farmers have got traditional land tenure arrangements, about half of the land appropriated from white farmers has since the consolidation of the Ciskei remained government owned (Water Research Commission, 2003). Despite the valley difficulties emanating from its troubled past, there have been some positive developments concerning utilisation of resources. To date, the formation of a water user association and catchment forum has brought together various communities inclusive of small-scale and large-scale farmers to a level where they collectively decide on good resource conservation practices in the valley (Water Research Commission, 2003).

4.2.3 Demographics

Nkonkobe has a population of 160311 which is 8.7 percent of the total population of Amatole District Municipality. The Municipality covers an area of 375 500 hectares (Nkonkobe Municipality, 2004). The average population density is 0.43 persons per hectare. The majority of the population (61 percent) resides in villages, 20 percent on farms and 19 percent is in urban areas. Social services and government grants are the

largest sources of cash income in this municipality, constituting 53.0 percent to total Gross Geographic Product (GGP) (Nkonkobe Municipality, 2004). The main language is IsiXhosa spoken by 94.28%, followed by Afrikaans 4.12%, English 0.76%, then other languages (Nkonkobe Municipality, 2004).

A description of the population characteristics is crucial for the purpose of understanding the socio-economic features of Kat River Valley. Figure 4.2 shows the population of Kat River Valley between the period 1996 and 2001. Basically, there are three ethnic groups constituting: Black Africans, Whites and Coloureds.

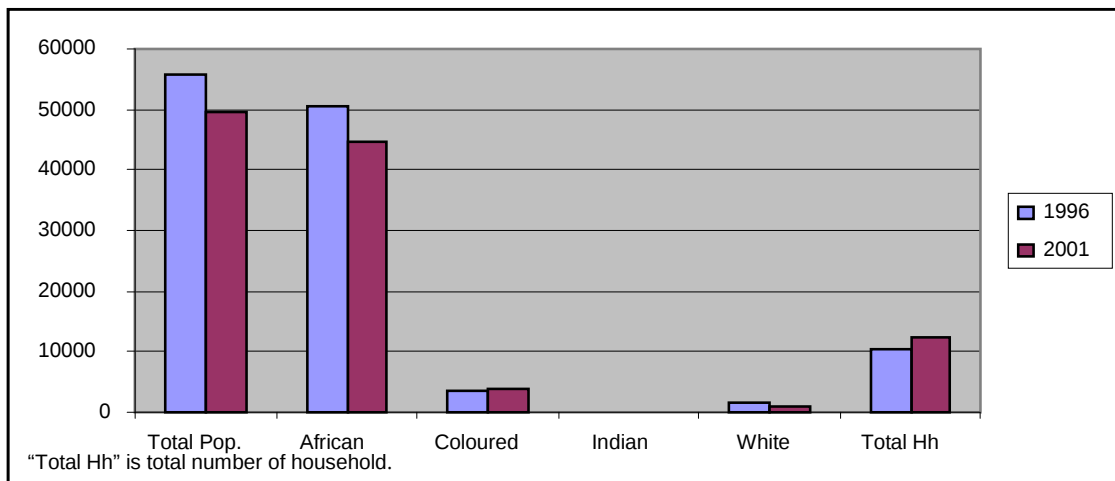


Figure 4.2: Population in the Kat River Valley. Source: Mujikanovic (2005).

Figure 4.2 depicts that the majority of the Kat River Valley inhabitants are Africans (blacks) followed by coloureds then whites. By 2001 there was a total of about 50 000 people in the valley, a decrease from the 1996 population of about 55 000 people. Farolfi (2005), as cited by Mujikanovic (2005), attributes the population decrease to the HIV/AIDS pandemic.

4.2.4 Land issues: tenure and ownership

Although comprehensive data on land issues is unavailable, there is evidence of considerable land tenure insecurity, resulting from numerous land claims. In fact, land claims have been lodged on 129 parcels of land in the Seymour and Alice parts of

Nkonkobe, formerly in the Ciskei homelands. There has also been an issue of boundary disputes, particularly in Middledrift (Nkonkobe Municipality, 2004).

To date, some of the land within the former Ciskei is still state-owned, implying that rural people have no title to their land (Nkonkobe Municipality, 2004). From focus group discussions, it has been learnt that the issuing of title deeds in Kat River Valley is now at an advanced stage. The Minister of Agriculture has approved the issuing of title deeds to farmers. The Eastern Cape provincial government has since taken over the task of securing of title deeds upon resolution of existing land claims. However, many farmers remain skeptical (Focus group discussions).

4.2.5 Livelihood

Nkonkobe Municipality is characterised by a series of impediments to human welfare due to high unemployment levels (Nel and Davies, 1999). The situation is made worse by the presence of low industrial activities (Nel and Davies, 1999). Amongst these obstacles are a high poverty rate resulting from high unemployment rate, low income and lack of basic skills required to spur local economic development, inadequate infrastructure and social services, low agricultural productivity, high dependence on government grants and inadequate and inefficient income generation strategies to improve the economic base of the municipality (Nkonkobe Municipality, 2004). De Wet (1993), as cited by Nel and Davies (1999), says income derived from agriculture does not exceed 10% of the average rural income. Many rural people rely on gifts, state pensions and migrant labour remittances for household survival (Nel and Davies, 1999).

Kat River Valley, like the rest of Nkonkobe, is generally considered as a low-income area (Nel and Davies, 1999). In this respect, a situational analysis of the area reflects that there is no noteworthy industrial or mining sector and the area is largely rural. The valley lacks basic services such as electricity (by 45 percent), flush toilets (60 percent), and cell phones (10 percent). Mujikanovic (2005), citing Farolfi and Jacobs (2005), indicates that the situation is aggravated by high levels of illiteracy and unemployment (80 percent

unemployment). However, many of the valley inhabitants in agriculture as the dominant economic activity.

4.2.6 Natural resource base

Generally, Nkonkobe like the rest of Eastern Cape is characterised by poor shallow soils, which are not conducive for intensive farming (Nel and Davies, 1999). However, there are various agricultural activities including citrus farming, beef and dairy production.

A subsistence agricultural sector, emerging commercial citrus farmers and irrigation schemes, especially in Kat River Valley, characterise the municipality (SA Routes, Bookings and Info Systems, 2005). In terms of resources, there is high potential for agriculture (in some areas), forestry and tourism in Nkonkobe Municipality. However, these resources have not been fully exploited to the benefit of the Municipality (Nkonkobe Municipality, 2004).

4.2.7 Agricultural potential

As mentioned before, some areas of Nkonkobe Municipality has a high potential for agriculture. The agricultural sector contributes only 17 percent towards the municipality's GDP (Nkonkobe Municipality, 2004). However, there are various agricultural activities including citrus farming, beef and dairy production, in some parts of the Municipality such as the Kat River Valley. Farming in Kat River Valley is supported by the availability of natural assets such as favourable soils and adequate water supply. The Kat River Valley is the main source of water to perform the agricultural activities. Agriculture activities are also facilitated by the terraced basin topography and foot slope bottom lands enclosed by the steep mountain slopes (Water Research Commission, 2003). Rainfall on the high ground is around 1000 mm per annum whereas it is much lower in the valley bottom (600 mm) and can only support limited rainfed cultivation (Water Research Commission, 2003). The predominant vegetation type is acacia bush capable of

sustaining livestock farming and some pockets of montane forest on the high ground of the Valley (Water Research Commission, 2003).

Because of the Kat River Valley potential, small-scale agriculture and emerging commercial citrus farmers characterise the Valley (SA Routes, Bookings and Info Systems, 2005). Citrus farming involves emerging and commercial farmers practicing mainly for export purposes (Water Research Commission, 2003). Crop and livestock production is mainly practised by small-scale communal farmers. There is also game farming in the Valley (Situational analysis).

Nevertheless, despite the agricultural potential, the valley is characterised by a series of impediments which include lack of title deeds for land inhabited. Due to the inconsistent climatic conditions compounded by poor grazing practices, the Valley has experienced land degradation in the form of sheet, gully and donga erosion on the foot slope areas (Water Research Commission, 2005). Despite the presence of the Kat dam and communal or yard taps, water supply is unreliable for the majority of the villagers (Water Research Commission, 2005).

4.3 Sampling procedure

The selected sample comprised smallholder farmers who are involved in the production of crops and livestock in Kat River Valley within Nkonkobe Municipality. Open-ended interviews with community leaders and focus groups have resulted in the general conclusion that Kat River Valley is the ideal location to carry out research because farming activities taking place in the area. There is no farming going on in some rural parts of the Municipality. In some cases farmers are sparsely populated.

Against the foregoing background, a sample of 80 farming households was drawn from three towns in the former Ciskei “homeland” of South Africa, now included in the Nkonkobe Municipality of the Amatole District of the Eastern Cape Province. The three

towns, Fort Beaufort, Seymour and Balfour, were drawn randomly from the six main towns of the Municipality. This sampling procedure is illustrated on Figure 4.2.

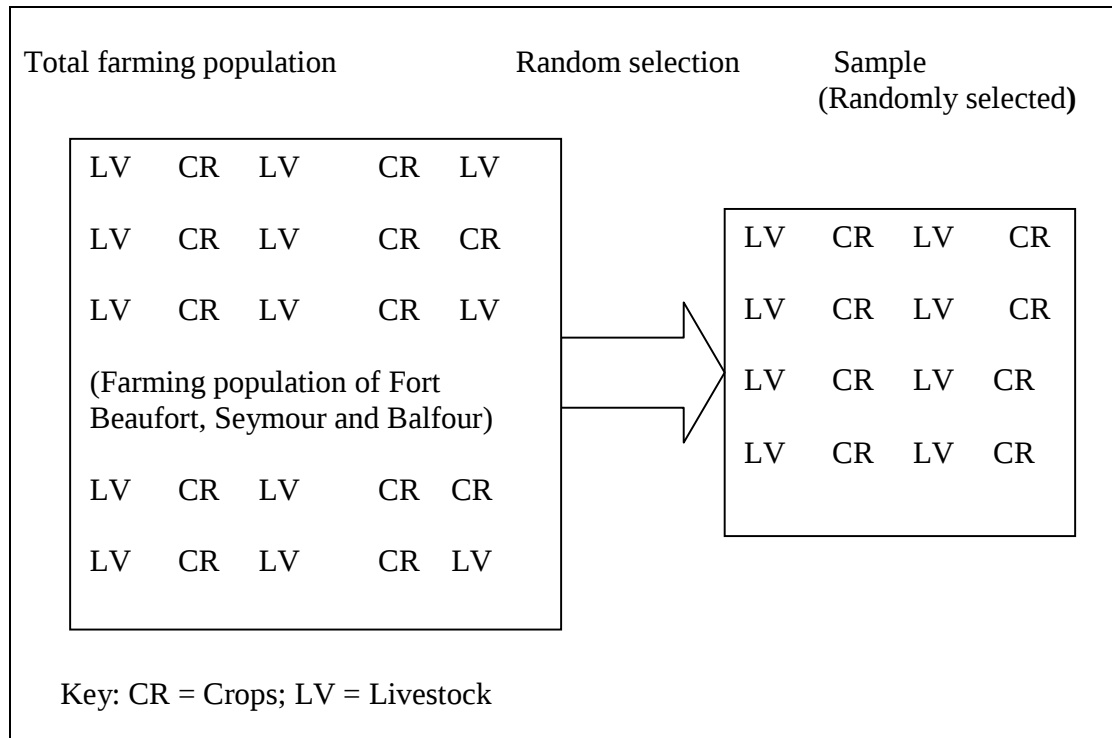


Figure 4.3: Diagram illustrating probability sampling

A total of 40 farmers from each of the two production activities (crop and livestock) were randomly selected from the farming population of Seymour, Fort Beaufort and Balfour within the Kat River Valley. There was no specific number of farming households per location because the sub-municipalities generally share the same geographical and institutional setup (Nkonkobe Municipality, 2004).

4.4 Data collection methods and instruments

Primary data were collected via interviews using questionnaires, focus groups and situational analysis. The field work commenced with a situational analysis of the study area, followed by focus group discussions to acquire the general information of the

institutional set-up of the area. Finally, detailed information required in the study was gathered using a structured questionnaire.

A situational analysis was employed in the study to assess the local situation which helped to identify the sample population, designing of the questionnaires and feasibility of the study. The method involved an observation of the settlement set-up of the study area. An assessment of the area with regard to income generating activities such as agriculture, game farming, mining or any other industrial activities was carried out using this method.

Focus group discussions were conducted in this study to gather information regarding the institutional set-up of the study area. Essentially, the method involved a discussion with community leaders and other people with knowledge of the area. However, only general information of concern to Kat River Valley communities was acquired using focus groups. In this regard, issues such as the land tenure status of farmers and their perceptions were obtained.

Both qualitative and quantitative data were principally collected through questionnaires. A single-visit household survey using structured questionnaires which covered a wide range of issues, including demographic information, costs and returns, marketing arrangements, and access within a broad definition was employed. Although Bourque and Fielder (2002) assert that questionnaires are used to collect data from people who complete the questionnaires themselves, the enumerator in this study used the questionnaires to carry out the interviews with farmers. With the help of three enumerators, a total of 80 questionnaires were used to collect data from the sample population. Unlike in a posted questionnaire, this interview process ensures direct communication with respondents. In this case, there is clarity whenever a question posed to the interview is not clear. Information from illiterate respondents is also captured using this method. An interview provides the platform to gain cooperation, hence there is minimal loss of information (Leedy and Ormrod, 2004). The method also ensures

avoidance of spoilt or lost questionnaires. Timely response is also achieved using this method.

The data captured using questionnaires were utilised for different levels of analysis. Firstly, the data were used to describe the demographic and socio-economic characteristics of the study area. Secondly, the data was used to determine how different factors influence each other. In this regard correlation analysis and binary logistic regression were employed to identify variables fitted into the final model for determining the implication of technical constraints for market access. In the latter case (logistic model), four key production variables constituting the definition of technical inputs were identified and each made a response variable. These variables are equipment, information, inputs and infrastructure. Lastly, the data were used to find key technical constraints affecting the Kat River smallholder farmers and their implication for market access. To find out key constraints affecting smallholder farmers, a review of the models and variable specifications was done.

According to Killick, Kydd and Poulton (2000), market access refers to whether or not consumers and sellers are well-informed about demand/supply situations and how easily each party can take advantage of the available opportunities. Invariably, this will be influenced by the transaction costs which will in turn depend on, among other factors, the physical conditions of the infrastructure, access to production and marketing equipment, and the way the marketing functions are regulated. These factors also have implications for production of farm produce and determine the level of farm income. The International Fund for Agricultural Development (IFAD) takes a similar view of market access which is seen as a three-dimensional condition comprising questions of physical access, structure, and producer's access to the required skills and information to participate profitably in the marketing process (IFAD, 2003). While these definitions make intuitive sense, they have not been tested empirically within the recent South African smallholder context. Accordingly, the explanatory variables considered included information, equipment, infrastructure, distance to market, total value of farm assets, and total farm income for 2006, while the response variable was defined as whether or not all

marketable produce was sold at the end of the farming season (Table 4.1). The key variables considered for the model are described in Table 4.1

Table 4.1: Definition and units of measurements of key variables modeled

Dependent variable	Definition	Value
Market access	Farmer being in a position to sell all produce destined for the market.	Coded 1 if farmer sold all marketed surplus, and 0 otherwise
Independent Variable	Definition	Value
AGE	Age of the household head in years	Actual age in years
EXP	Farming experience	Years of farming experience
ENTEXP	Farm enterprise experience	Years of experience in the current farm enterprise
DIVERS	Farm enterprise diversification	A Dummy variable = 1 if the farm is diversified; 0 otherwise
OFFINC	Off-farm income	A Dummy variable = 1 if the farmer earns off farm income; 0 otherwise
LANDSEC	Land security of land ownership rights	A Dummy variable = 1 if the farmer has secure land rights; 0 if the farmer is insecure
MKTDISTANCE	Distance to output market	Actual distance in kilometres coded 1 if its 15km and above and 0 below 15km
EXTC	Extension contact	A dummy variable = 1 if the farmer is being assisted by an extension officer; 0, otherwise
LABOR	Farm labour	A dummy variable = 1 if the farmer employs labour; 0, if not
INPUT	Technical farm inputs	A dummy variable = 1 if the farmer gets all the necessary technical inputs in time; 0, otherwise
INFORMATION	Technical, price, market, demand and supply information, contact with extension services and other technical support from public/private sectors	Coded 1 if the farmer is satisfied with level of information available and 0 otherwise
EQUIPMENT	Technical farm equipment such as tractor, ploughs, etc	Coded 1 if farmer owns or has ready access and 0 otherwise
ASSETVALUE	Inadequate technical farm inputs, tools, implements, farm machinery, motorized and other transport equipment, household appliances, residential facilities.	Rand value of total assets reported and sighted coded 1 if R30 000 and above and 0 if below R30 000
INFRASTRUCTURE	Publicly-provided infrastructural facilities including road network, power, water, etc	Coded 1 if the farmer is satisfied with the available infrastructure, and 0 otherwise
TOTALINCOME	Gross value of annual farm production from crop and livestock	Rand value of gross annual production coded 1 if R30 000 and above and 0 if below R30 000

4.5 Variable specification

A dependent variable for market access is explained by a situation where the farmer is either able to market his/her farm produce or not. Failure to access the market in this study has been hypothesized to be principally a result of constraints in independent variables as shown on Table 4.1.

In this study, a dichotomous independent variable for determining market access is denoted as 0, indicating technically constrained farmers, and 1 otherwise. The independent variables of the study are hypothesised to have associations with the dichotomous dependent variable. To be specific, the existing theoretical explanations, findings from several studies relating to technical aspects as well as the authors' knowledge of the farming systems have been used to select 15 potential explanatory variables, hypothesised to indicate existence or otherwise of technical constraints. The variables are presented below.

Age (AGE): this variable measures the actual age of the household head in years. Younger farmers are expected to be more technically constrained than older farmers who are perceived to have acquired experience of farming and resources. Therefore, it is hypothesised that age of household head and market access are positively correlated. This is supported by an observation by Mushunje, Belete and Fraser (2003) that older farmers are likely to have more resources at their disposal.

Farming experience (EXP): this variable measures the number of years a farmer has been engaged in farming. It can be hypothesised that the lesser the number of years the farmer is involved in farming, the higher the probability of being technically constrained because certain farming techniques comes with experience. Thus, there is a positive correlation between market access and farming experience.

Enterprise experience (ENTEXP): this variable measures the number of years a farmer has been engaged in the current enterprise. Other factors being constant, it can be

hypothesised that the lesser the number of years the farmer is involved in the current farm enterprise experience, the higher the probability of being technically constrained.

Farm enterprise diversification (DIVERS): this variable measures whether or not the farmer has diversified his/her farming enterprise. Farmers engaged in a number of farm enterprises are less likely to be technically constrained since they stand a better chance of making a profit with the possibility of more capital injections into the farm. In fact Mohammed and Ortmann (2005) refer to diversification as a risk management strategy. Therefore, it can be hypothesized that farm enterprise diversified farmers are likely to access the market and vice versa.

Off-farm income (OFFINC): this variable measures whether or not the farmer is receiving off-farm income. Off-farm income can help lessen on-farm technical constraints since the farm has alternative capital inputs. Farmers who lack off-farm income are likely to be affected by finance related technical constraints than those who have. This is also supported by Mashatola and Darroch (2003). Thus, it can be hypothesized that there is a positive correlation between off-farm income and market access.

Land insecurity (LANDSEC): this variable refers to the insecurity of land ownership right. Land insecurity is likely to be one of the major causes of technical constraints because it inhibits farmers from taking profitable and environmentally sound investment (Enki, Belay and Dadi, 2001). Therefore, in this study it is hypothesized that land insecurity inversely affects market access.

Distance to the market (MKTDISTANCE): referring to the distance to the output buyers. The greater the distance to the market, the more severe the logistical problems such as transport and transport cost. Remote located farmers are likely to lack market access.

Extension contact (EXTC): this variable measures whether farmers are in contact with extension officers more than twice a month or not. Extension service is an important

source of farming information and advice to smallholder farmers (Enki, Belay and Dadi, 2001). Thus, it can be hypothesised that lack of or inadequate extension contact inversely influence, market access.

Labour shortage (LABOR): refers to the household head's opinion about the absence or shortage of labour. It is hypothesised that smallholder farmers heavily rely on human labour and that its shortages negatively affect production leading to lack market access

Inadequate technical farm inputs (INPUT): this variable is referring to inadequate farm inputs such as hybrid seeds, pesticides and chemicals. It is hypothesized that farmers with inadequate technical inputs are less likely to achieve enhanced production and productivity leading to lack market access.

Inadequate infrastructural facilities (INFRASTRUCTURE): this variable is referring to inadequate physical and market infrastructural facilities. It is hypothesized that farmers with inadequate physical and market infrastructural facilities lack market access.

Inadequate technical information (INFORMATION): this variable is referring to information which the farmer needs in improving production, productivity and marketing. Farmers with inadequate technical information are likely to lack market access.

Inadequate technical farm equipment (EQUIPMENT): this variable is referring to the presence or absence of equipment such as ploughs, planters, etc. which the farmer might deem necessary for improving production and productivity. Farmers with inadequate farm equipment are likely to lack market access.

Total gross income in 2006 (TOTALINCOME): Gross value of annual farm production from crop and livestock. Low values signify lack of market access and vice versa because farm income is a reflection of the value of surplus production.

Value of assets (ASSETVALUE): Inadequate technical farm inputs, tools, implements, farm machinery, motorized and other transport equipment, household appliances, residential facilities entails a lack of market access and vice-versa. Assets can act as collateral when one requires credit or in some cases assets such as a vehicle can be used as transport to access markets.

4.6 Method of data analysis

This section discusses how the data were analysed. Descriptive and correlation analyses as well as logistic regression modeling have been employed. In this case, the Statistical Package for Social Sciences (SPSS) and Minitab software have been used. A review of literature to support the analytical framework is presented.

Binary responses are very common in the field of social sciences. For example, Maddala and Trost (1982), as cited by Long (1997, p.34), made use of binary responses to study the decision by a bank to accept or reject loan applications. Gunderson (1974), as cited by Long (1997), also used binary response to determine whether or not if a trainee decided to remain with the sponsoring employer. Recently, Mohammed and Ortmann (2005) investigated whether or not commercial dairy farmers in Eritrea were insuring their livestock. Mashatola and Darroch (2003) determined whether the repayment performance of sugarcane farmers in KwaZulu-Natal using the graduated mortgage loan repayment scheme. Domenrich and McFadden (1975), as cited by Long (1997, p.34), analysed factors affecting the use of public versus private transportation for commuting. Darroch and Clover (2005) also used a binary logit model to determine factors affecting the survival, growth and success of small, medium and micro agribusinesses in KwaZulu-Natal.

There are several methods that can be used in explaining a dichotomous (binary) dependant variable (Y_i). For instance, discriminant analysis, linear probability model, logit and probit model can be used. However, the fact that discriminant analysis is based on the assumption of multivariate normality limits its usage since the assumption may be

violated (Klecka, 1980, p.2). The linear probability model is discarded because of criticism over its assumption that the marginal probability is assumed to be constant (Long, 1997). Logit and probit models generally achieve the same results (Gujarati, 1992). The binomial logistic regression model can be preferred in some cases due to its simpler mathematical structure. On that basis and also given the dichotomous nature of the data collected, the binomial logistic regression model (logit model) shall be used for this study (Gujarati, 1992).

The term “logit” refers to the natural logarithm of the odds (“log odds”) which indicates the relative probability of falling into one of the two categories on some variable of interest (DeMaris, 1992, p.2). According to Liao (1994, p.10), binary logit has only two categories in the response variable – event A or non-A. Harrell (2001, p.215) asserts that the model shows how a set of predictor variable X is related to a dichotomous response variable Y (In (Pi/1-Pi)). The dichotomous response variable Y = 0 or 1, with Y = 1 denoting the occurrence of the event of interest. Dummy variables, also known as indicators or bound variables, characterize dichotomous response.

As indicated above, the model for this study is a binary choice model requiring the estimation of the probability that a smallholder farmer in the enumerated localities would have unsold produce in the current farming season on the basis of the reported market performance for 2006. Since only two options are available, namely “produce sold” or “produce not sold”, a binary model is set up which defines Y=1 for situations where the farmer sold all produce, and Y=0 for situations where some or all produce was not sold. Assuming that x is a vector of explanatory variables and p is the probability that Y=1, two probabilistic relationships as stated by Gujarati (1992) can be considered as follows:

$$p(Y=1) = \frac{e^{\beta'x}}{1 + e^{\beta'x}} \dots\dots\dots(1)$$

$$p(Y=0) = 1 - \frac{e^{\beta'x}}{1 + e^{\beta'x}} = \frac{1}{1 + e^{\beta'x}} \dots\dots\dots(2)$$

Since equation (2) is the lower response level, that is, the probability that some or all farm produce would not be sold, this will be the probability to be modeled by the logistic procedure by convention. Both equations present the outcome of the logit transformation of the odds ratios which can alternatively be represented as:

$$\text{logit} [\theta(x)] = \log \left[\frac{\theta(x)}{1 - \theta(x)} \right] = \alpha + \beta_1 \chi_1 + \beta_2 \chi_2 + \dots + \beta_i \chi_i \dots \dots \dots (3)$$

and thus allowing its estimation as a linear model, and for which the following definitions apply:

θ = logit transformation of the odds ratio

α = the intercept term of the model

β = the regression coefficient or slope of the individual predictor (or explanatory) variables modeled

χ_i = the explanatory or predictor variables.

In line with Hosmer and Lemeshow (1989), Agresti (1990) and Gujarati (1992), the right-hand term in equation (3) above is the natural logarithm of the modeled variables. A goodness-of-fit test, following Hosmer-Lemeshow, was conducted by examining the Pearson Chi-square outcomes calculated from the table of observed and expected frequencies as follows:

$$X^2_{HL} = \sum_{i=1}^g \frac{(O_i - N_i \pi_i)^2}{N_i \pi_i (1 - \pi_i)} \dots \dots \dots (4)$$

where:

N_i = the total frequency of the items in the i^{th} group,

O_i = the total frequency of obtaining particular event outcomes in the i^{th} group,

π_i = the average estimate of the probability that a particular event outcome in the i^{th} group would be realised.

The foregoing operations were feasible within standard Minitab and SPSS packages. In relation to equation (3), the analysis generated the odd ratios using the maximum likelihood procedure. The goodness-of-fit test examined the displayed results for the Pearson, Deviance and Hosmer-Lemeshow methods all of which gave high enough p-values to dispel doubts about the model fitting the data. It was therefore not necessary to consider alternative estimation procedures.

CHAPTER 5

PRESENTATION OF RESULTS

5.1 Introduction

This chapter presents the results of the analyses of the survey data. The chapter begins with the presentation of an analysis of the demographic and socio-economic characteristics of the smallholder farm sector of Kat River Valley. Results of descriptive analysis are presented. To describe the farming system in its entirety and identify the broad categories of constraints, the study utilised the data on the head of the households' demographic backgrounds, farm costs and output market access.

5.2 Demographic and socio-economic characteristics of the smallholder farm sector

This section presents the results of the demographic and socio-economic characteristics of the survey farmers. The section begins with the demographic characteristics followed by the socio-economic characteristics. In both cases summary tables of respective variables are presented. Detailed analysis is made on variables requiring any further interpretation. The summary statistics of the variables comprising demographic and production/marketing data are presented in Tables 5.1, 5.2 and 5.3.

5.2.1 Demographic characteristics

The demographic characteristics in this study are important in determining the extent to which they influence farmers' responses in the study. Table 5.1 presents the results in relation to age, household size and education, while Table 5.2 presents the results in respect to the distribution of the households by gender and marital status.

Table 5.1: Summary statistics of demographic variables (n=80), smallholder farmers, Kat River Valley, 2007.

Variable	Minimum	Maximum	Mean	Std Deviation
Age	27	91	57.5	14.63
Household Size	2	21	6.73	3.04
Education (years)	0	17	8.39	3.65

Source: Field Survey, 2007.

In terms of the demographic characteristics of the sample, Table 5.1 shows that the majority of the farmers' average age was about 57 years, with the youngest farmer being about 27 years old while at least one farmer was 91 years of age. Figure 5.1 below shows the age group categories of farmers engaged in crop and livestock farming. The sample farmers have been placed in six distinct age categories, as follows: less than or equal to 30, 31 to 40, 41 to 50, 51 to 60, 61 to 70 and over 70 years. The results in both cases show that very few young farmers are engaged in farming. There is a proportion of less than 10% (in crop farming) in the age group less than 30 years and less than 15 % in age group 31 to 40 years for both enterprises. This confirms the preceding findings in the post-colonial generation in many African rural settings as the younger generation migrates to urban areas (Mine, 2006). The age groups between 41 and 70 show a successive increase in the number of farmers at each level. In line with the foregoing, the age group of 41 to 50 years shows a marked increase in the number of farmers. There is an overall percentage of 15% and above in both enterprises of the total sample in this category.

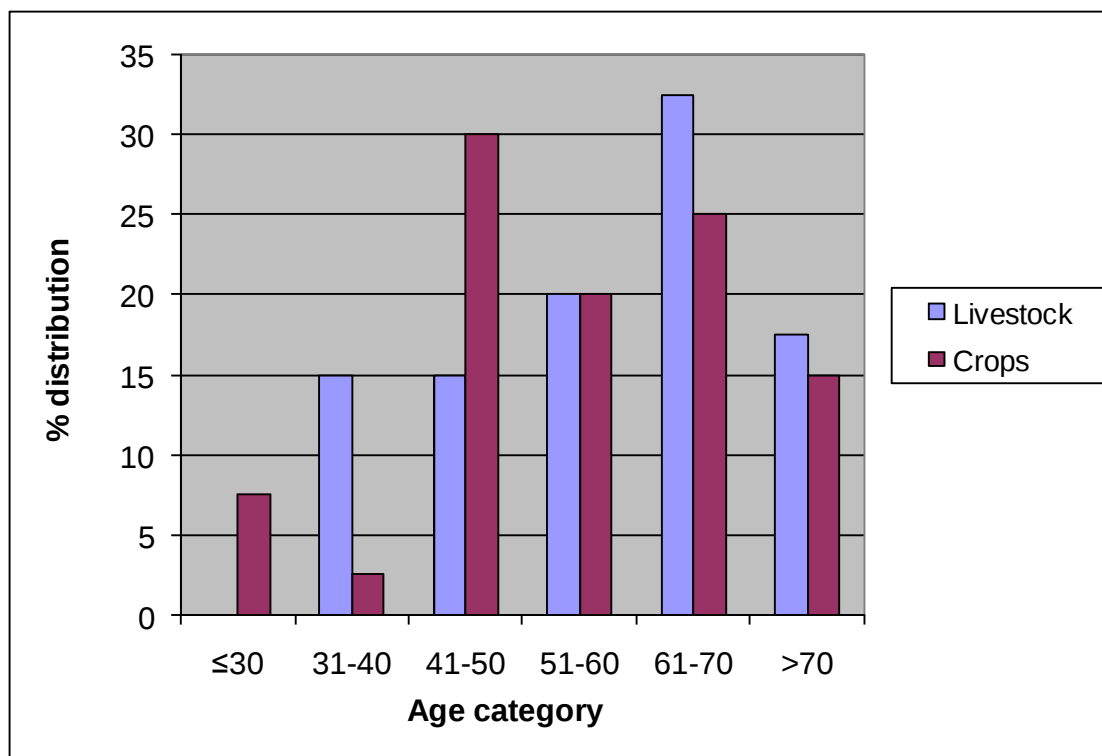


Figure 5.1: Distribution of households by age group of smallholder famers, Kat River Valley, 2007

As shown on Figure 5.1 the age group 51 to 60 years reflects more almost the same proportion as the latter described category. The escalation in figures (above 25% of total sample in both enterprises) becomes even more pronounced for the age group 61 to 70 years possibly due to additional numbers of retired people who resort to farming. Unlike in the previous age group (61 – 70 years), there are relatively fewer farmers after the age of 70. Taking cognisance of the fact that life expectancy in South Africa stands at 42.45 years (World Bank, 2007) and given a pyramid demographic structure one would expect fewer aged people in farming as well.

Household size ranged from 2 to 21 but averaged about 6.7 persons. The sample suggests that the majority of the farmers had some education, mostly up to 7 years of primary school education although some did not have any education at all. A few of the sample farmers had post-secondary education.

Table 5.2 below shows the gender of the household head for each of the two farming types (crop and livestock).

Table 5.2: Distribution of households by gender and choice of farming type, Kat River Valley, 2007.

	Type of Farming		Total
	Crop	Livestock	
Gender			
Male	24 (44.4)	30 (55.6)	54 (57.5)
Female	16 (61.5)	10 (38.5)	26 (32.5)
Total	40 (100)	40 (100)	80 (100)

Source: Field Survey, 2007

Note: Figures in parenthesis show percentage

According to Table 5.2, more males are involved in farming than females. This could be a household reflection of a patriarchal role of men as head of the household. In most cases female farmers are classified as household head when they are single, divorced or widowed. Nonetheless, women are relatively more involved in crop farming than livestock farming and the opposite is true for males. However, the proportions in Table 5.2 are not strikingly different to warrant any further analysis.

Sample farmers were assessed on their marital status. The marital status is classified in four categories namely: single, married, widowed and divorced. Figure 5.2 shows the distribution of households by marital status of household head.

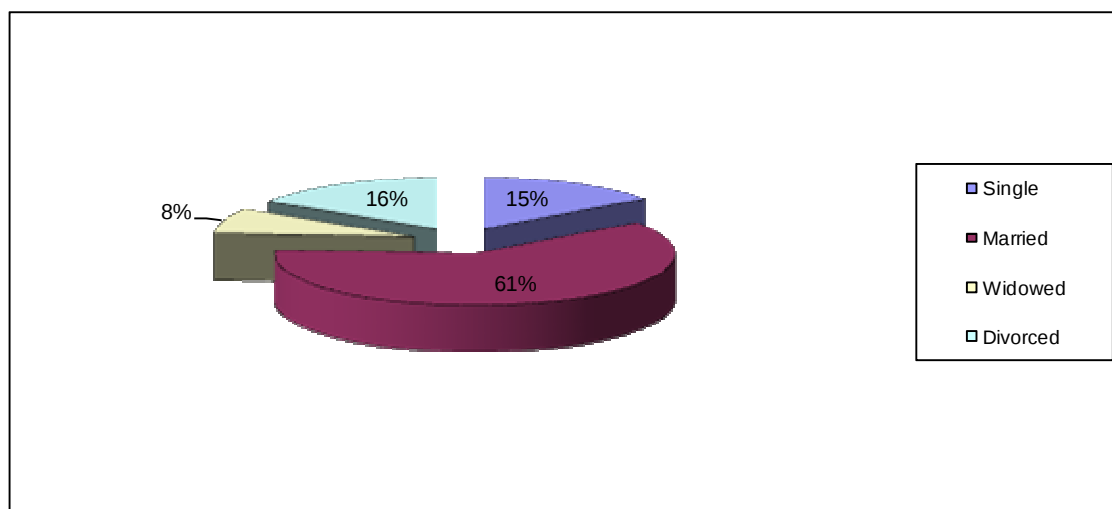


Figure 5.2: Distribution of households by marital status of household head, Kat River Valley, 2007.

Figure 5.2 above suggests that most household head respondents (61%) are married, while the rest are widowed, divorced and single. In an African family set-up, the husband and wife play a complementary role with regard to their livelihoods. For instance, whilst the wife is expected to perform day to day household chores such as cooking for the family, the husband might be more involved in income generating activities such as farming. In the absence of a spouse, one can encounter a situation whereby he/she has to perform duties on behalf of the other. In this regard, the extent to which he/she can be expected to undertake farming activities would be expected to differ from married spouses, other factors being constant. The implication of this scenario is that a household comprising husband and wife is better off than a single headed household in terms focusing on farming activities.

5.2.2 Socio-economic characteristics

Survey farmers were assessed on different aspects regarding their socio-economic characteristics. This section presents different socio-economic characteristics of sample farmers which include cultivated area, farming experience, farm income, various farm inputs and market related variables. Table 5.3 and 5.4 presents the summary statistics of socio-economic characteristics of the survey farmers.

Table 5.3: Summary statistics of socio-economic variables (n=80), sample household, Kat River Valley, 2007.

Variable	Minimum	Maximum	Mean	Std Deviation
Area Cultivated (ha)	0	25	2.59	4.95
Years of farming experience	1	55	21.5	10.38
Current enterprise experience	1	50	14.8	8.1
Permanent labour employed	1	8	3.00	1.883
Seasonal labour employed	1	30	5.52	6.720
Total Asset Value (Rand)	0	240300	23126	45622
Crop Income (Rand)	0	157575	8199.9	24790.3
Livestock Income (Rand)	0	135000	9416.6	19989.12
Total Income (Rand)	0	157575	17616.5	29287.2
Market Distance (km)	0	300	18.9	36.04

Source: Field Survey, 2007.

As Table 5.3 shows, the gross value of farm produce ranged from nothing at all to as much as R158,000 (equivalent to US\$23,000) in one year, and the market value of assets ranged from those with negligible valuable assets to those with as much as R240,000 (equivalent to US\$35,000) at current prices. It should be noted that these data were not analysed for purposes of estimating household incomes but merely as a means for classifying the households into rough socio-economic categories. However, they do show that about half of the survey households lacked the possibility to earn more than R20 per day (or about US\$3) on the basis of their reported gross value of farm income. The very high standard deviations of both asset value and gross farm income variables further confirm the huge disparities in socio-economic status even within the smallholder class, suggesting that it is by no means a homogeneous category.

There was also evidence that some farmers supplemented their income by undertaking non-farm activities. It was also clear from the data that the majority of the surveyed farm households had been in the farming business for some time, with some having length of

experience of up to half a century. The data also picked up a few new entrants into the farming business.

Regarding the distribution of assets and income across the sample, the study reveals a pattern that closely mirrors the situation in respect to the overall population. For one thing, the data demonstrates pronounced inequities in terms of gross earnings from both livestock and crop production and the ownership of tangible/valuable assets in the study area.

Table 5.4: Economic factors as a proportion of total sample (n=80), sample household, Kat River Valley, 2007

Modeled Variable	Frequency	Percentage (%)
Fertiliser Use	19	23.75
Farm Planning	67	83.75
Assets	30	37.5
Infrastructure availability	28	35.0
Information availability	35	43.75
Credit Need	58	72.5
Credit Access	12	15.0
Equipment ownership	38	47.5
Unsold produce	71	88.75
Non-farm employment	7	8.75
Land ownership (title deeds)	31	39
NAFU membership	4	5
Workshop attendance	54	68
Access to price information	80	100
Extension services	53	66
Market guaranteed in 2006	44	55
Selling problem in 2006	15	19

Source: Field Survey, 2007

The results similarly reveal other areas of inequalities in the smallholder sector and the serious constraints that this segment of the population still faces. For instance, the results show that a large number of smallholders did not apply mineral fertilizers probably because they could not afford them. This situation is probably linked to the fact that, despite an overwhelming need for credit by the survey farmers estimated at about 73% (Table 5.4), only 15% of the smallholders actually received some form of credit during 2006. There is also evidence from Table 5.4 that the majority of smallholders were constrained by insufficient access to infrastructure and information, with many of them lacking the assets to expand productive activities. It was also obvious that most of the survey farmers had a long-term commitment to farming, with as many as 81% of them having prepared long-term farm plans during 2006 or earlier. The consequences of the previously mentioned constraints seem to be that only about 11% of the households were able to market the entire surplus they had intended for sale.

5.2.2.1 Non-farm employment

Generally, the sample comprises of farmers who are not involved in non-farm employment. Out of 80 farmers interviewed there are only 7 farmers (8.75%) who indicated that they have non-farm occupation, as shown in Table 5.4. This finding can be a result of the fact that in Nkonkobe Municipality, unemployment is endemic (Nel and Davies, 1999; Nkonkobe Municipality, 2004).

5.2.2.2 Land ownership

This study examined the patterns of land ownership in the smallholder farm sector. In this case, farmers situation regarding title deeds was also assessed in this study. The study also determined on whether or not farmers were satisfied with the size of the land they farm and reasons for their response. Figure 5.3 displays the results concerning land ownership. Figure 5.4 and Table 5.4 present the results regarding farmers' satisfaction or dissatisfaction with their size of land and reasons for such responses, respectively.

The results show that 39% (Table 5.4) of survey farmers have title deeds. As shown on Figure 5.3, the largest proportion of the survey farmers carry out their farming activities on state owned land. Significantly, some of the farmers have either inherited or bought land (about 21% of all farmers in each of the categories). To a lesser extent, the land is either leased or rented.

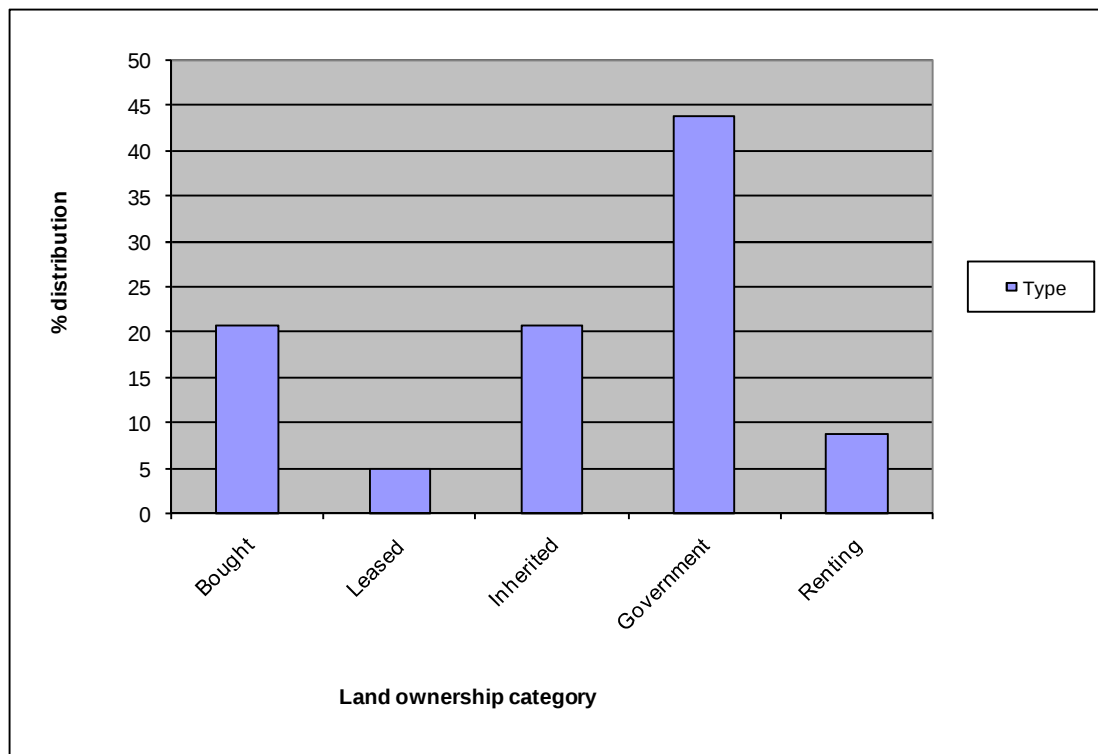


Figure 5.3: Type of land ownership, survey farmers, Kat River Valley, 2007

The picture portrayed above is similar to literature findings concerning Kat River Valley. About half of the land appropriated from white farmers at the unification of the Ciskei in 1980 remains government owned (Water Research Commission, 2005). The remaining half of the non-government owned land would have been bought and thereafter rented or leased. As highlighted in the literature, some of the smallholder farmers in the valley have historic land tenure (inheritance) (Water Research Commission, 2005).

From the findings, 61% of the surveyed farmers have no title deeds. The remaining proportion (39%) constitutes farmers with title deeds. Lack of title deeds is mainly due to the fact that land is still owned by the government Land ownership by the government as

a reason for lack of title deeds by farmers constitutes a greater proportion (83.3%) of all farmers without title deeds. This result mirrors one of the most common characteristic regarding land tenure in smallholder farming in developing countries (Amani, 2004). According to Amani (2004), the implication of the foregoing scenario is tenure insecurity giving rise to lack of desire for land improvement and negligence of land conservation. A sense of ownership is lacking as the land is regarded as a common property. The other reasons for lack of title deed are expected as land is either rented or leased. This land could possibly be part of the land appropriated from white farmers since the consolidation of the Ciskei (Water Research Commission, 2003). About half of the land remained government owned and part of it might have been sold to private individuals who could be leasing it in some cases.

5.2.2.3 Access to credit

Accessibility of credit to survey farmers as well as the sources of credit were examined in this study. In this regard, the study investigated whether or not the survey farmers were accessing credit. Farmers cited commercial banks and agricultural cooperatives as sources from which they obtain credit. Information on the different sources of credit available to the survey farmers is presented in Figure 5.4. Table 5.5 presents the cross tabulated results regarding accessibility of credit to the farmers who need credit.

Table 5.5: Distribution of survey households by credit accessibility (n=80), Kat River Valley, 2007.

		Need for Credit		Total
		No	Yes	
Access to Credit	No	15 (22.1)	53 (77.9)	68 (100)
	Yes	7 (58.3)	5 (41.7)	12 (100)
Total		22 (27.5)	58 (72.5)	80 (100)

Source: Field Survey, 2007. Chi-Square Significant at 0.09

As shown in Table 5.5 above, 78% of the survey farmers had no access to credit although they needed it. This is strikingly different from 22% of the survey farmers who had access to credit. The fact that the majority of farmers have no access to credit is corroborated by the current findings in South Africa. Despite the existence of agricultural credit institutions in South Africa (Machethe, 2004; Department of Agriculture and land Affairs, 2007), a significant number of farmers have no access to credit (Machethe, 2004). The results also show that of the few who do not need credit 58% are already accessing it.

There are two types of credit sources which are being accessed by farmers. As shown in Figure 5.4, the farmers use either commercial banks or agricultural cooperatives as their credit sources.

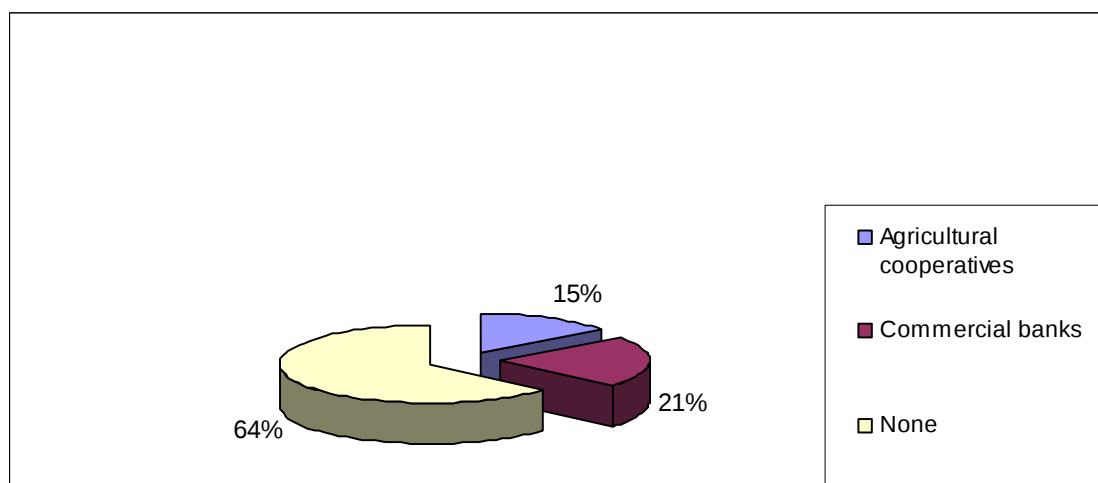


Figure 5.4: Sources of credit used by survey farmers, Kat River Valley, 2007.

In total, 36% indicated that they have access to credit. Most of those who use credit (21%) obtains it from commercial banks. The only other sources of credit are agricultural cooperatives which are used by about 15% of the total survey farmers. The remaining proportion (64%) represents farmers who do not use credit in their farming operations. Despite the presence of other agricultural credit institutions in South Africa, it is startling to note that only agricultural cooperatives and commercial banks were cited as the sources of credit. However, Machethe (2004) mentions the Land Bank and Agricultural Credit Scheme which are neither commercial banks nor agricultural cooperatives.

5.2.2.4 Labour employed

As shown in Table 5.3, the mean number of permanent and seasonal employees was 3 and 6 respectively. The standard deviation for permanent labour (1.883) is small, implying that the permanent labour employed is more or less close to the average, which is 3 in this case. However, the standard deviation for seasonal labour (6.720) is relatively high, implying a wide gap between the maximum and minimum number of labour employed. Table 5.6 and Figure 5.5 present information on the type of labour employed and subsequent types in that order. When labour is employed, it is done on either a permanent and/or temporary basis or any combination of the two. In the case of temporary labour,

the number of seasonal working days per year range between 60 and 90 days. Table 5.6 shows the number of households who are employing at one employee at either permanent or temporary basis. As shown on Table 5.6 the majority of the farmers (about 73%) do not employ both seasonal and permanent labour. Fewer farmers (about 27%) in the survey are involved in the employment of permanent or seasonal labour.

Table 5.6: Distribution of survey households by type of labour employed, Kat River Valley, 2007, (n=80).

	Permanent labour employed	Seasonal labour employed
No	58 (72.5)	58 (72.5)
Yes	22 (27.5)	22 (27.5)

Source: Field Survey, 2007

Labour is regarded a crucial factor of production in smallholder farming considering the simplicity of technology in most African countries (Amani, 2004; Taylor and Cairns, 2001). In fact Mushunje, (2001, p.67) asserts that labour inputs substitute for capital inputs to a greater extent in smallholder agriculture. The verification by the results of the absence of labour as one of the crucial requirements in smallholder farming is a probable indication that the farmers are resource constrained which can be traced to lack of financial resources to employ labour. However, of the few farmers who employ labour, 77% and 91% are satisfied with their quantity and quality of labour, respectively.

The labour employed by the sample farmers is obtained from three sources, namely: neighbours, hired and family labour. Figure 5.5 presents information regarding types of labour used by survey farmers. The majority (68%) employ their own family labour, while 32% of labour requirement is met through hired labour and/or neighbours.

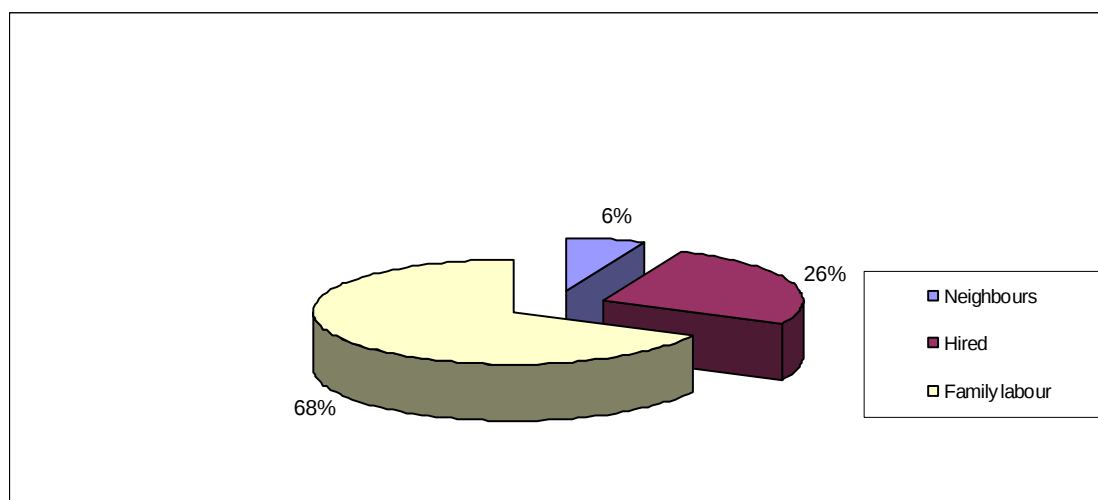


Figure 5.5: Type of labour available to survey farmers, Kat River Valley, 2006

The employment of family labour by the majority of farmers is probably linked to the scale of operation, rudimentary technology of production and missing labour markets. Research by Mushunje (2001, p.67) and Dorward (1999) suggest that smallholder farming is characterised by usage of family labour. However, the fact that the majority of farmers employ family labour might suggest the farming limitations encountered by the farmers in Kat River Valley. Neighbours constitute the lowest fraction (6%) of the sources of labour which can be an indication that neighbouring households could be having surplus labour to spare.

5.2.2.5 Support services available to survey farmers

It is crucial in this study to determine the extent to which sample farmers benefit from support services such as national unions (such as NAFU) and workshops. NAFU is aimed at assisting previously disadvantaged resource poor farmers through support services and capacity building programmes (NAFU, 2005). Since NAFU is an association aimed at assisting black farmers to enter mainstream commercial agriculture, assessment of survey farmers regarding their membership is important. Generally, farmers in Kat River Valley are not members of NAFU (Focus group discussion). This is further confirmed by a field a survey result which shows that only 5% (Table 5.4) are members of NAFU and the

remaining 95% are not members. This implies the majority of survey farmers in Kat River Valley are excluded from NAFU benefits despite their background which is similar to most former homelands.

Agricultural workshops are one of the essential farmer support services whose purpose is to convey farming knowledge to farmers (Amani, 2004). Farmers in this study were asked whether or not they were attending workshops. The results in Table 5.4 show that farmers attending agricultural workshops (68%) significantly outweigh those who do not attend (32%). These results might suggest that the farmers are willing to acquire information concerning their agricultural practices.

5.2.2.6 Source of price information

Acquiring marketing information is one of the most important factors determining the marketing of output for farmers. In addition, information gathering is also regarded as an objective of any farmer who intends to market his/her produce (Ministry for Agriculture and Land Affairs, 1998). The results show that all sample farmers (Figure 5.4) use different modes of communication to acquire information regarding prices for their products. The modes of communication include radio, television, internet, auction and newspapers. Figure 5.6 presents the sources of price information of both crop and livestock farmers.

As shown in Figure 5.6, many sources to which farmers access output price information have been cited for both crops and livestock enterprises. Usage of same sources of price information in both enterprises exists on local markets, friends and self determination of price. Local markets are the most accessed source of information in crop farming whereas friends are the most dominant source of information for livestock farmers. In livestock farming, with the exception of local markets, friends, auction and self-determining of prices (the farmer marks the price), the other sources are not popular, as shown in Figure 5.6.

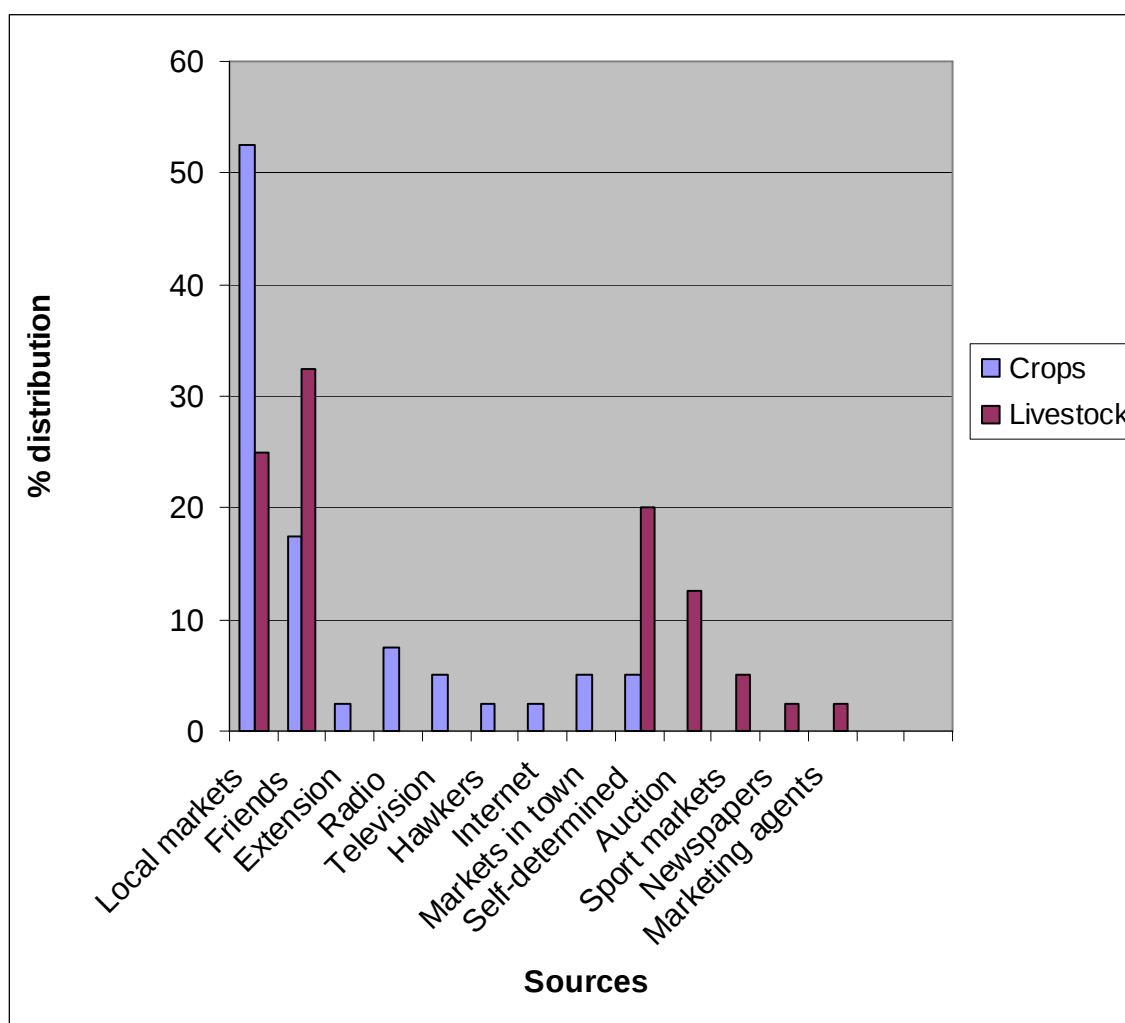


Figure 5.6: Access to a formal price information for survey farmers, Kat River Valley, 2007

The overall picture as depicted by Figure 5.6 reflects that the survey farmers intend to market their products. The dominant sources of price information (local markets, friends and self-determined) (Figure 5.6) have several implications regarding the prevailing types of markets. Perhaps, reliance on “friends” and “self-determination” as sources of price information, mirrors the inability to search for price information which can be traced to high transaction costs (in search of information) or a lack of economies of scale. Such a characteristic relates to thin markets (Ahmed *et al*, 2005). In another case, farmers’ reliance on local markets can also be linked to lack of information. Such a characteristic

relates to incomplete markets (Ahmed *et al.*, 2005). Prices set under such circumstances might not reflect the true market value of products.

Sources of price information such as the internet, newspapers and extension agents score low in this study. This can be linked to findings in the literature that acquiring market information is mainly done by commercial farmers who have access to websites and publications, among other sources (Groenewald *et al.*, 2003, p.8). Groenewald *et al.* (2003, p.8) pointed out that though extension staff might not be timely and convenient, it is an important source of output price information for most smallholder farmers. However, reliance on extension services as a source of price information in this study is low. The study reports very few farmers (less than 5%) who indicated reliance on extension services.

5.2.2.7 Extension services utilised by survey farmers

According to Machethe (2004), extension services play an important role in empowering farmers with farming techniques, skills and knowledge. It is therefore critical to assess the availability of extension services. The farmers' evaluation of the quality of services and frequency of visits by extension officers has also been assessed in this study.

Most farmers (66%) in this study indicated that they are getting extension services (Table 5.4). However, there is sizeable number of farmers (34%) not receiving extension support. Possibly, such farmers would be having other sources of assistance or they might not be interested in getting the service. However, the possibility of a scenario in the latter case is a cause for concern considering that farmers need to keep abreast with the dynamics in farming. Alternatively, some farmers might be failing to access extension services. Possibly, such a scenario suits the observation by Groenewald *et al.* (2003, p.8) that extension services might not be timely and convenient. Such irregularities might be an indication of staff shortages in which case some farmers might not get assistance at all.

The quality of extension services (aspects such as reliability and accuracy of information) is necessary in this study in determining the extent to which farmers benefit from

extension support services. The quality of extension officers as evaluated by farmers ranges from poor to excellent. Figure 5.7 explains how survey farmers view the quality of services of extension officers who visit them.

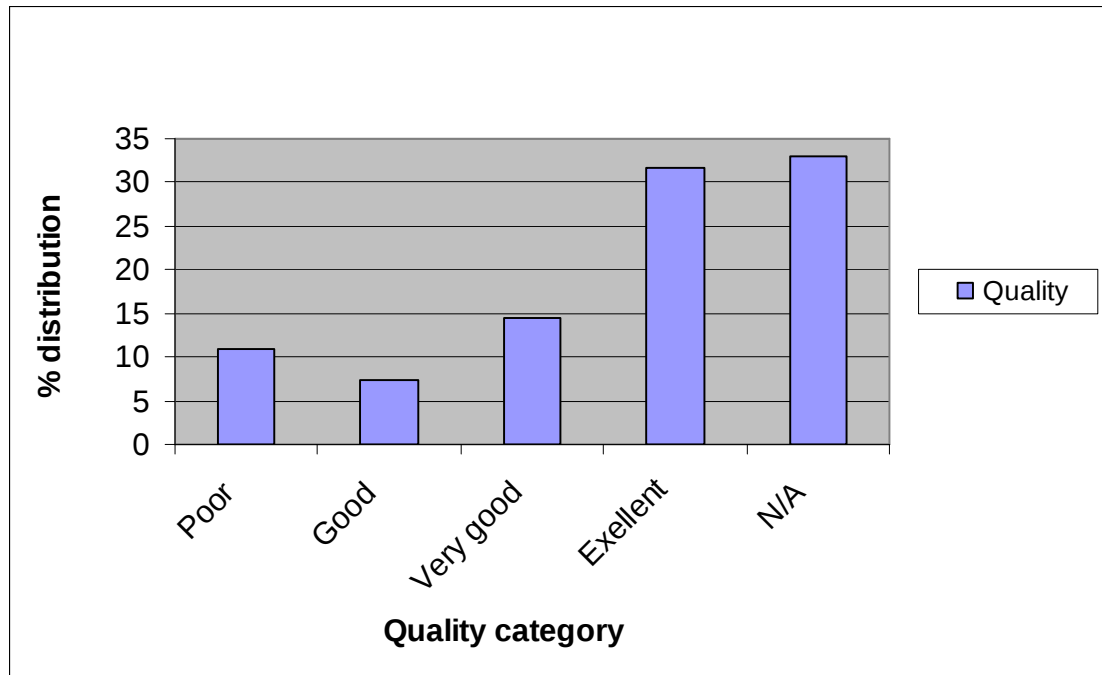


Figure 5.7: Quality of services offered by extension officers to survey farmers, Kat River Valley, 2007

Note: The category “NA” stands for those farmers who did not receive extension visits.

For those farmers who have contact with extension services, they are generally impressed with the quality of service as most responses are within the range of good, very good and excellent. Many survey farmers find the extension services to be excellent. The fact that there are few farmers who indicated poor quality of service by extension officers is still a cause for concern.

The frequency of visits by extension officers has also been assessed on survey farmers to determine the extent to which they are in contact with extension services. Many of (44%) of the survey farmers indicated that they receive extension services once per month. A significant number of farmers (35%) pointed out that they visit twice per month. The remainder hinted that they consult extension officers whenever they need help.

5.2.2.8 Market access by survey farmers

An evaluation regarding market access was carried out on survey farmers in terms of market: guarantee (assurance), distance and contract. Market guarantee for agricultural products is crucial since to a larger extent it is determined by different market accessibility factors such as quantity and quality of produce. In this regard, it is also crucial to assess the prevalence of contract farming among survey farmers, as one of the requirements for market access. The distance to the market cannot be ignored since the extent to which farmers participate in different types of markets can be influenced by it.

The study evaluates whether or not farmers were guaranteed a market in 2006. The outcome of the results shows that 55% of farmers (Table 5.4) were not guaranteed a market in 2006, a factor which can be traced to information asymmetry leading to incomplete or thin markets (Ahmed *et al.*, 2005). When a farmer is not guaranteed a market, it may imply that information regarding the market is lacking. Uncertainty regarding market access can also be linked to lack of contracts in farming. Contract farming has become important with the growing complexity and industrialization of agri-supply chains. There is sufficient literature supporting the view that contract farming has become an important institution for empowering smallholder farmers in ensuring ready markets, technology and secured inputs (Kirsten and Sartorius, 2000). There are no farmers in the survey sample involved in contract farming. However, the absence of contracts does not imply lack of market access because there are other alternative marketing arrangements such as direct selling to formal markets.

The actual distance to the market may show the extent to which farmers participate in different markets. Table 5.3 shows that the sample farmers sell their products to markets that are within a 300 kilometre radius. In this study, it is clear that none of the farmers is accessing international markets. In terms of market participation, Figure 5.8 portrays that the majority of farmers operate in local markets.

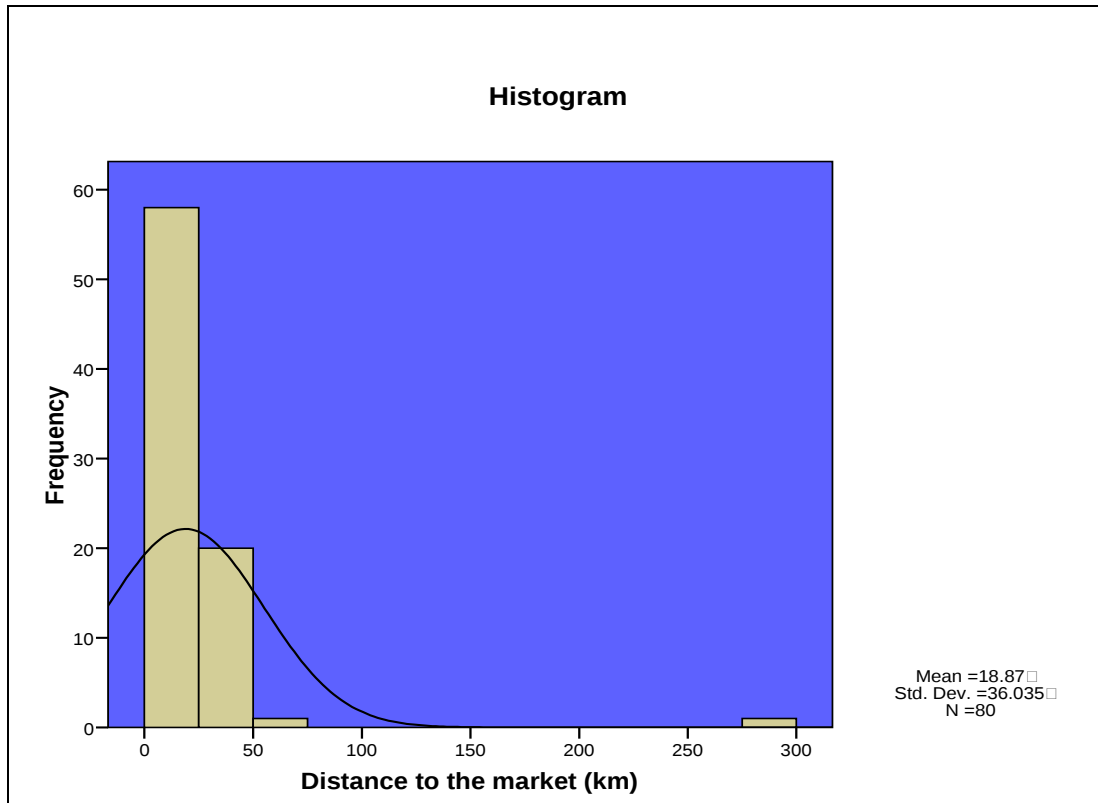


Figure 5.8: Actual distance to the market for survey farmers, Kat River Valley, 2006.

Figure 5.8 shows that the majority of farmers sell their products within a radius of less than 75 kilometres. The farmer operating within 300 kilometres happens to be the only one involved in the production of wool sold via auction in Port Elizabeth. The mean distance to markets is 18.87 kilometres and the standard deviation is 36.035 kilometres - far from the mean which can be the effect of the maximum distance (300 kilometres). Noteworthy is the proportion (50%) of farmers undertaking farm gate sales in crops (Machethe, 2004; Makhura, 2001, p.33). Such marketing operations are more of last resort than the intended destination which mirrors a low market participation that can be traced to several factors namely; poorly developed road network (National Department of Agriculture Directorate: Marketing, 2005), high transaction costs in search of market information (Machethe, 2004) and insufficient output for economies of scale (Groenewald *et al.*, 2003, p.8).

5.2.2.9 Utilisation of produce

In most cases, agricultural production in smallholder farming is mainly for subsistence purposes. However, it is important in this study to find information regarding the uses of surplus if generated. Such information is important since it helps in determining the extent to which farmers participate in output markets. Therefore, this study examined the different uses of surplus generated by survey farmers.

Four uses of surplus by the survey farmers were noted, namely: donations, farm gate sales, roadside and nearby town sales. Figure 5.9 presents the information regarding the utilisation of produce in both crop and livestock production in 2006.

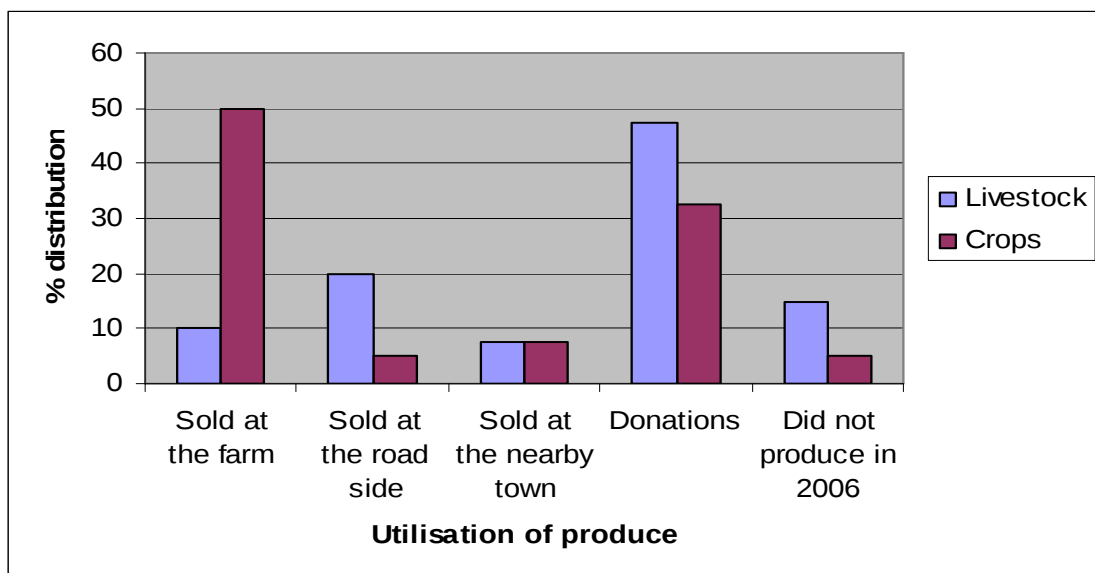


Figure 5.9: Utilisation of produce in 2006 by survey farmers, Kat River Valley.

The general picture reflects selling at the farm and donations as the most cited uses of surplus. Livestock farmers in the sample mainly use their products for donations whereas crop farmers mainly undertake farm gate sales. Crop farmers are also significantly involved in donations. Apart from the farmers who did not produce in 2006, farmers were either selling at the nearby town or vending.

5.2.2.10 Problems with selling products

An assessment on whether or not survey farmers have encountered problems in selling their products is useful in that it helps in determining the extent to which survey farmers were constrained in accessing output markets in 2006. As shown in Table 5.4, 19% of survey farmers had some selling problems. The cited reasons for selling problems were failure to access the market due to poor quality output, as well as failure to secure transport to convey products to the market. South Africa considers quality as one of the factors to be carefully monitored in its supply chain. The Agricultural Product Standards Act of 1990 (Act No. 119 of 1990) of South Africa calls for agricultural products and other related products to conform to certain standards regarding quality (National Department of Agriculture Directorate: Marketing, 2005). In this regard poor quality can deny a producer access to the output market. The remainder of farmers had no problems with selling their products. However, with reasons such as donating to neighbours being cited as one of the uses of surplus produce, it could be a case of farmers failing to access the market. As a result they get used to some form of “food banking” in each other as a way of growing social capital to an extent of forgetting about possible lucrative markets elsewhere.

CHAPTER 6

ESTIMATION OF THE SMALLHOLDER MODEL

6.1 Introduction

This chapter presents the results of the estimation smallholder model in order to ascertain the principal factors influencing access to markets. Selection of the relevant constraining factors was done in a step-wise manner. Following that, two types of analysis, namely correlation and logistic regression, were carried out. Correlation analysis was been conducted to identify key variables to include in the logistic regression model as response variables influencing market access. On the basis of a definition of “*technical inputs*”, key production inputs have been identified. In turn, the logistic model was employed in a step-wise manner sequentially introducing each of those variables as response variables in the model. Therefore, the extent to which these variables influence each other became the screening process for selecting the independent variables influencing market access. Lastly, the results of the logistic modeling of the technical constraints affecting market access are presented.

6.2 Relationships among the variables.

A correlation analysis was employed to ascertain the nature of the relationship of variables to determine the extent to which they mirror theory or intuition regarding the causation of market access constraints. At 5 percent level of significance, the nature of the relationship amongst the following quantitative variables was tested: Age, household size, farming experience, enterprise experience, total farm income and total value of assets. The reason for not including the demographic information about the sample farmers (see Table 4.1) in the logistic regression is that this thesis has defined the straightforward objective of examining the impacts of the components of market access which have more to do with production/marketing issues and associated problems. The

outcome of the analysis resulted in a significant relationship between farming experience and age as well as farming experience and enterprise experience. The correlation results are presented in Table 6.1.

Table 6.1: Correlation analysis showing the relationship among selected the socio-economic variable, Kat River Valley, 2006.

	Age	Household Size	Farming Experience	Enterprise Experience	Total Farm Income	Total Asset Value
Age	1.00000					
Household Size	0.14217	1.00000				
Farming Experience	0.33643*	0.11523	1.00000			
Enterprise Experience	0.17441	0.14861	0.51808*	1.00000		
Total Farm Income	-0.11030	0.09945	0.05369	0.03355	1.00000	
Total Asset Value	-0.01353	-0.11603	0.10024	-0.12059	0.16134	1.00000

Source: Field Survey, 2007

*Pearson Correlation coefficient (r) is significant at the 5% level

6.2.1 Relationship between farming experience and age

Farming experience refers to the number of years in farming. It is hypothesised that farmers acquire more farming experience as they get older. Chiremba and Masters (2003) cited farming experience as a predictor for good farming performance. On that basis, other factors being constant, older farmers are less likely to be constrained and vice versa. As shown on Table 6.1, some moderate positive correlation ($0.3 < r \leq 0.6$) (Statsoft,

2008) exists between farming experience and age. The implication of this result is that as farmers grow older, they are likely to acquire more farming experience.

6.2.2 Relationship between farming experience and enterprise experience

Enterprise experience refers to the number of years in the current farm enterprises. It is hypothesized that farmers are less likely to be constrained as they acquire more farm experience. Enterprise experience is higher in farmers with more farming experience than with those without. Possibly the correlation between farming and enterprise experience suggests that the more experience the farmer has in farming, the more he/she is likely to adapt to different farming enterprises. Based on the argument that farming experience is a predictor of good farming performance, enterprise experience can also play an important role in smallholder farming. In this regard, experience (at both farm and enterprise level) plays a key role with regard to market access because farmers adapt not only to certain farming techniques but also to information regarding markets. It is clear in this study that farming experience positively influences enterprise experience. Therefore, farming experience is very important in market access.

There is a negative correlation between the total farm income and total asset value. However, there is no significant relationship as shown in Table 6.1 above. The same applies to household size and the total asset value. In the former case, it is expected that as farmers get older, they are likely to have assets and income emanating from business experience over the years. However, the result suggests that as farmers get older, they are less likely to acquire assets. In this case, perhaps the correlation is influenced by other factors such as larger household size and increased dependence burden such that the chances of acquiring more assets are reduced.

6.3 Input variable relationships

This section presents the results of the regression of the response variables on the predictor variables. As highlighted in chapter one, this study purposes to identify key

technical constraints faced by farmers and their implication for market access. Taking cognisance of this study objective, it is crucial to determine how individual components of technology are influenced by other production and marketing variables. Ellis (1988) has defined a “*technique*” to be a combination of inputs employed to produce a given output. Gebremedhin (1993) further specified these inputs to be in the form of farm equipment, information, infrastructure and other complementary inputs directly related to produce such as seeds and chemicals. This analysis has therefore attempted to determine the factors influencing key production inputs. Equipment availability has been found to be influenced by farming type and credit. Production and marketing information is influenced by risk and future planning. Complementary input availability depends on loan access. A relationship also exists between infrastructure and credit. A summary of these regression results is tabulated in Table 6.2 below.

Table 6.2: Results of the logistic regression

Response Variable	Predictor Variable	Coefficient Estimate	Probability
Equipment	Farming type	1.7269	<.0001
	Credit	-0.7153	0.0314
Information	Risk	0.5780	0.0857
	Future planning	0.8396	0.0095
Complementary inputs	Loan Access	1.2413	<.0001
	Labour	-0.3339	0.2795
Infrastructure	Credit	0.5421	0.0777

Source: Field Survey, 2007

Note: significance tests were carried out at the 10% level.

6.3.1. Equipment

In relation to the availability or absence of farm equipment, the results show that the type of farming type carried out by the small-scale farmer was an important factor in the extent to which farm equipment can be constraining in the smallholder environment. This

result seems to be statistically significant on the basis of the values of the coefficient estimate (1.7269) and the probability value ($p=0.0001$).

On the other hand, the results show that farmers who indicated that they did not need credit were shown to be less likely to be constrained by farm equipment availability probably because they were already well-capitalised and therefore in a position to meet equipment needs from own sources. This result confirms the literature in the sense that farming equipment relates to farming technology and, other factors being constant, farmers who possess equipment are likely to be productive (Machethe, 2004; Amani, 2004).

About 48% of the respondents were missing some of their crucial equipments for production and marketing purposes such as ploughs and weighing scales. The proportion of respondents missing some of their equipment is significant enough to influence the above mentioned type of farming and acquiring credit.

6.3.2 Information

Survey farmers were asked to indicate the frequency with which at which they take risks in trying new farming techniques. Their response category was either always/sometimes or never. The results suggest that farmers who (always or sometimes) try new farming techniques (take risk) are more knowledgeable than those who do not (never), as far as production and market information are concerned. It is logical to expect risk takers to try to minimise the chances of being 'losers' by taking precautionary measures through information gathering. Farmers who have little information about available opportunities are less likely to take risk. Similar results emerged in relation to whether farmers (always or sometimes) make production and marketing plans for the future or not (never). Farmers who planned for the future seemed not to be constrained by information compared to farmers who plan only occasionally.

Survey farmers were asked on the frequency at which they plan for the future. Their response was categorised as either always/sometimes or never. Planning for the future in farming is consistent with reasonable expectations of some future benefit accruing from investment of resources in a certain manner. It is expected that for such a plan to be made, the farmer would have sought information on what is likely to happen to production and marketing processes in the future. Thus, a farmer who lacks information is limited in planning for the future.

Marketing information is crucial because it has often been cited as leverage for enhancing the bargaining power of farmers (Ministry for Agriculture and Land Affairs, 1998). However, the mere fact that 56% of the sample farmers lack information confirms the foregoing findings that information regarding production and marketing in South African smallholder farmers is often untimely and sometimes missing (Groenewald *et al.*, 2003, p.8).

6.3.3 Complementary inputs

In respect to production and marketing inputs, the results show that loan access were crucial to the situation of the smallholder farmer. For instance, according to the results, farmers who did not have ready access to production loans appeared to be more constrained in respect to possession of inputs than those farmers who declared ready access to production loans. This observation highlights the importance of capital injection in farm investments especially in a capital-deficit environment such as the rural areas of the former independent homelands of South Africa. The result is not unique from the foregoing research findings which propose the need for credit to cover short term seasonal needs (Gouse *et al.*, 2002; Amani, 2004). The implication therefore is that absence of a loan is a constraint to production inputs.

However as shown on Table 6.2 the availability of farm labour was not significant. Looking more specifically at the labour input, it was observed that an inverse relationship exists between the enumerated inputs and farm labour. According to the results, farmers

facing labour bottlenecks seemed to be less constrained in terms of ownership of production and marketing inputs and vice versa. While this is rather surprising and mildly curious, it is probably explained by the fact that farmers owning inputs are likely to also have the necessary technology (capital intensive technology) to apply those inputs so that reliance on farm labour is less. The study did not specifically examine the direction of causation but only examined the association between the variables. It seems to be the case that the farmers who buy farming inputs are the relatively more enlightened farmers who also are relatively better-off and can afford capital equipment such as tractors and other labour-saving technologies. However, the result still makes sense if taken from the dimension that if modern inputs are employed as a single production method (technique) together with relevant technology, there might be no need for labour/abundant labour.

6.3.4 Infrastructure

There is a positive correlation between physical infrastructure (such as dip tanks, milking parlour etc.) and credit. Farmers who said they did not need credit were also shown to be indifferent to the availability of physical farm infrastructure compared to those who said they needed credit. This is probably because the farmers who do not need credit are more likely to be better off in terms of initial capital endowment and may have already installed such facilities at the time of establishing the farm business. This of course would be different in the case of farmers who do not have adequate start-up capital. This finding however contradicts the findings made by Ahmed (1994, p.143) regarding the purchasing of inputs (1994, p.143).

According to Ahmed (1994, p.143) the selling of modern agricultural inputs is logistically easier in areas with well developed infrastructure. Modern technology usage can be significantly high in such areas. In that respect, farmers are said to be more receptive to new technology under such circumstances. In addition, Ahmed (1994, p.143) discovered that, infrastructural development tends to reduce expansion of the rural informal credit markets by substituting them with the formal one. Taken from a different dimension, there is a linkage between Ahmed's findings and the foregoing result because

the desire by farmers to acquire credit to purchase modern technology is likely to be influenced by the state of the infrastructure. The fact that 65% of farmers lack crucial infrastructure facilities highlights their predicament in terms of the need for credit.

6.4 Technical constraints influencing market access.

As explained in the chapter on methodology, the binary response variable for the logistic regression was defined as presence or absence of unsold produce at the end of the 2006 farming season. The assumption is that as long as a farmer is not able to sell all that he/she intended to sell, regardless of what proportion of total production this represents, the farmer faces marketing constraints and the farmer can be described as facing market access difficulties. The probability (alpha) level was set at 0.05 and a logistic regression analysis was run through multiple iterations. The estimated results of the analysis are presented in Tables 6.3 and appendix 2-4 in respect to the maximum likelihood estimates, the goodness-of-fit tests, and the associations between the response variable and the set of predictors modeled.

At the initial fitting of the model, it was found that both equipment ownership and the infrastructure profile were not statistically significant even though the goodness-of-fit tests suggested that the model could be a good description of the data ($p > 0.05$). Since significance was required for efficient prediction, both variables were dropped by backward elimination to obtain a final structure for the model as presented in Table 6.3. Although the Log-likelihood ratio in this case was somewhat higher than in the earlier run (Appendix 2), the fact that it was declining with successive iterations provided sufficient grounds to accept the model as a good description of the data.

These results suggest could mean that the most important factors determining the chances that a smallholder in the survey area would face marketing constraints were access to information, asset ownership, value of agricultural production and extension assistance.

Table 6.3: Results of logistic regression analysis

Parameter	Maximum Likelihood Estimates						
	Coef.	SE Coef.	Z-value	P-value	Odds Ratio	95% CI of odds ratios	
						Lower	Upper
Intercept	-7.640	2.173	-3.52	0.000			
Information	4.174	1.558	2.68	0.007	65.00	3.06	1378.80
Total assets	4.209	1.350	3.12	0.002	67.32	4.77	949.36
Total income	2.768	1.226	2.26	0.024	15.93	1.44	176.05
Extension assistance	0.6298	0.3027	4.3300	0.0374	3.524	1.076	11.541

Source: Field Survey, 2007

Note: significance tests were carried out at the 5% level.

6.4.1 Information

There is a strong positive relationship between market access and availability of information. The availability of information about such important market variables as prices, supply and demand, etc, is crucial to marketing performance. Prevalence of marketing information improves the bargaining power for producers (Ministry for Agriculture and Land Affairs, 1998). In this respect, if information regarding markets is missing, there is likely to be lack of market access even if there is marketable surplus available. The results in Table 6.3 demonstrate that the odds ratios for information and assets are so high (at 65.0 and 67.3, respectively) that they most probably choked off other effects. For instance, gross farm income, although highly significant at $p=0.024$,

was about four times less likely to constitute a binding constraint to marketing of farm produce than the other two explanatory variables, namely access to information and asset ownership. It would therefore have made little difference whether or not the farmer was served by a well-paved road network and had affordable power and water at his/her disposal.

6.4.2 Asset ownership

Asset shortages impact positively on market access and vice versa. The strong positive coefficient of 4.209 confirms this picture because market access is being influenced by having assets. According to Boughton *et.al* (2006) and Makhura (2001, p.33), market barriers are reduced when a farmer possesses assets. The situation with respect to asset ownership may reflect the complex environment in which the smallholder operates and the interrelationships among the farm business and the rest of the farm household. For instance, assets enumerated include farm structures, implements, and tools as well as farm machinery and equipment such as tractors, motor-vehicles, bicycles, etc. However, the fact that the result contradicts findings from literature can be attributed to other factors. One of the factors is aging assets which might not be aiding the farmer in accessing markets because they are no longer functioning.

6.4.3 Total income

There is a positive relationship between total income and market access. The value of agricultural production during 2006 represented gross farm income from crop and livestock production and could be a good proxy for socio-economic status of the farmers. This variable also mirrors the ability to finance marketing activities. The availability of increased farm income implies the financial capacity to ensure technical performance and consequently increasing the chances of accessing the market (Machethe, 2004; Amani, 2004). The result therefore confirms literature findings because in the absence of farm

income, the capacity to employ improved technical inputs and eventually accessing the markets becomes limited.

6.4.4 Extension assistance

Lack of market access has been influenced by lack of extension assistance despite the background of smallholder farming in South Africa which suggests more production and marketing assistance from extension officers. According to findings by Groenewald *et al* (2003, p.8), extension services in South Africa have often not been timely and incomplete. Production and productivity are likely to be high for farmers who get assistance from extension officers who empower them with farming techniques (Machethe, 2004; Amani, 2004; Ministry for Agriculture and Land Affairs, 1998).

6.4.5 Infrastructure

The results regarding infrastructure can also reflect the special circumstances of the smallholder farm family as well as the nature of the interactions among the explanatory variables. As explained in Table 4.1, infrastructure refers to publicly-provided physical assets at the service of the farm, including roads, power, irrigation facilities, etc. Whether or not these amenities are available would ordinarily be an important determinant of market access. But this constraint would only kick in when there is an output to sell and would have no significance to a smallholder who does not have anything to sell. If the farm is already so severely constrained in terms of insufficient information flow and lack of assets so that production is limited, availability or otherwise of infrastructure would have little chance of influencing the extent of marketed surplus.

Appendix 3 presents the results of the Goodness-of-Fit tests which show that, on the basis of alternative criteria, the model fitted the data very well. For instance, as appendix 3 shows, the ρ -values were consistently higher than the chosen probability level for the logistic regression modeling ($\rho=0.05$).

Similarly, the test of the degree of association between the response variable and the predicted probabilities gave encouraging results regarding the predictive power of the model. These results are shown in Appendix 4 and demonstrate convincingly that the model fell within the acceptable range on all the tested criteria of association.

6.4.6 Equipment

Equipment as included in the survey referred only to farm machinery and equipment. By showing the equipment variable not to be statistically significant, the study probably confirms what is generally known about the farm household as both a social and economic unit for which assets do not enjoy specialised uses as long as they are deployed to the service of the farm family.

6.4.7 Summary of key determinants of market access

In the light of the foregoing results, the logistic regression model can be summarised in the form of the following equation:

$$\text{Log(soldproduce)} = -7.64 + 4.174(\text{Information}) + 4.209(\text{TotalAsset}) + 2.768(\text{TotalIncome}) + 0.6298 (\text{ExtensionAssistance})$$

If the modeled variables are assigned algebraic notations such that unsoldproduce becomes Y, information becomes X_1 , Total Assets becomes X_2 , Total Income becomes X_3 and Extension assistance became X_4 then we can rewrite the above equation as:

$$\text{Log}(Y) = -7.64 + 4.174 X_1 + 4.209 X_2 + 2.768 X_3 + 0.6298 X_4 \dots\dots\dots(5)$$

Equation (5) will have the straightforward interpretation that reflects the strong positive influences of information and asset ownership on the probability of marketing surplus produce.

But, these results cannot be taken to infer that infrastructure and equipment are not important. What one can safely infer is that the results probably only highlight the extremely strong influence of information and asset position of the farm family. When farmers are severely constrained by information, asset, income, extension service and farming type, they cannot be expected to adjust to this constraint by undertaking farm gate sales, thus counteracting the effect of infrastructure deficiency. A farmer who is served by a poor road network may still report satisfactory sales of surplus. This is probably also true for the market distance variable which would be irrelevant as a constraint if farmers decide to sell largely at the farm gate because they are constrained by income to pay for transportation to distant markets, or lack information about profitable opportunities beyond the farm gate. The results probably also help in bringing out the important issue of lack of market power of the smallholder and his/her lack of control over the key determinants of market access. Whenever the smallholder has to adjust to a constraint, it seems almost inevitable that the dominant strategy would be to seek a way to survive in spite of the constraint rather than to remove it.

CHAPTER 7

SUMMARY AND POLICY IMPLICATIONS

7.1 Introduction

This chapter summarises different levels of the study which includes: introduction, literature review, methodology and results. The chapter begins with a summary of the introduction focusing mainly on background and problem statement, research problem, study objectives and hypothesis. The summary of characteristics of the smallholder agricultural sector and an overview of the technical framework follows, covering issues regarding definition, characteristics, importance, constraints as well as technical change in smallholder farming. The summary of agricultural marketing in South Africa is also presented covering different market related issues. Methodology has been summarised with regard to the study area, sampling procedure, data collection methods and instruments, variable specification and method of data analysis. The summary of presentation of the results constitutes the demographic and socio-economic characteristics of the smallholder farm sector, and the estimation of the smallholder model.

7.2 Background and problem statement

Dualism continues to characterise South Africa's agricultural sector due to the legacy of the apartheid regime's discriminatory policies. For this reason, two sectors, namely a highly developed commercial sector and a poorly developed communal farming sector co-exist in the same economy. The communal sector consisting of small-scale farmers mainly from the "former homelands" have in the past been deprived of key means of production. The smallholder farming sector has been confronted with technical and institutional constraints. Seemingly, this sector is still haunted by its past.

With the free market dispensation in response to the globalisation of markets, the condition for smallholder farmers in South Africa becomes even worse. Farmers have to adjust to the dynamics of agricultural marketing systems with minimal government intervention. It implies farmers' need for adjustments to the ever-changing requirements of the supply chain is crucial. That means taking into consideration consumer tastes, health, quality etc. Such adjustments to markets would be impossible without overcoming farming constraints.

In many developing countries, agricultural markets are not well developed. As a result farmers encounter considerable problems in marketing their products. However, the situation in South Africa is slightly unique as these markets exist and are to a larger extent developed. However, there are shortcomings in the smallholder farm sector emanating from an observation that markets are seemingly not accessible to smallholder farmers. In line with the foregoing, this thesis explored the implication of smallholder farmer technical constraints for market access in Nkonkobe Municipality. In doing so, a description of the main characteristics of the smallholder farm sector was necessary. Identification of the key technical constraints faced by the smallholder farm sector and their implication for market access formed the central theme of this study. A study of the interaction of the socio-economic production and marketing factors affecting the smallholder farm sector was also one of the objectives.

7.2.1 Characteristics of the smallholder agricultural sector and an overview of the technical framework

Different characteristics of smallholder farming have been reviewed. The smallholder farmers have generally been found to be characterised by meagre farm income, reliance on other sources of income, rational allocation of resources and limited technical know-how and lack of financial access to properly carry out farming.

An evaluation of the technical framework, comprising constraints and the induced innovation model for consideration for technical change has been carried out. Technical

constraints in smallholder farming was generally found to be the absence of equipment to relieve labor shortages, chaotic supply of complementary inputs (such as seed, chemical and water), insufficient human capital, and inappropriate transportation and infrastructure. The induced innovation seeks to explain why and how new technologies, practice and institutional change emerge. Promotion of science and technology by developing nations has been found to be crucial for agricultural development. The benefits of technical change in smallholder agriculture have been noted in scattered success stories where efficiency, food security, increased production and income have been noted.

7.2.2 Agricultural marketing in South Africa

This section summarises the agricultural marketing dynamics in South Africa. Agricultural markets in South Africa are generally developed. In fact the country's agriculture is undergoing industrialisation in response to global markets. In order to enhance market access and efficiency in a deregulated environment, the Marketing of Agricultural Products Act (Act No. 47 of 1996) was formulated. Standards regarding quality, packaging, and labelling among other standards for agricultural products are well stated in the Agricultural Products Standards Act, 1990 (Act No. 119 of 1990). Issues regarding sustainability of the environment are part of the procedures for inspection. Unfortunately, the majority of smallholder farmers fail to enter lucrative markets due to failure to conform to market requirements. To be specific, the following determinants have been found to be influencing market access: quantity and quality of output, physical and marketing infrastructure, marketing information, asset ownership, good agricultural practices, contract farming, land tenure security, technical capacity, extension services, labour and skills, value addition and credit.

7.2.3 Methodology

Nkonkobe Municipality is part of the former homelands. As such it is characterised by small size of land holding, land tenure insecurity, uneven development regarding service

provision and environmental collapse. The selection involved interviews with community leaders and focus group discussions. Eventually Kat River Valley was chosen as a study site as a result of various agricultural activities taking place in the area. Other areas were left out on the basis of either lack of farming activities or very limited agricultural activities per given geographical location. Probability sampling was been chosen to come up with a sample of 80 livestock and crop farmers. Data were collected through open-ended interviews of community leaders, focus groups as well as a single-visit household survey using structured questionnaires. The resulting data were used for three different levels of analyses.

7.2.4 Socio-economic characteristics of survey households and estimation of logistic model

The results were presented in three parts, namely: analysis of the demographic and socio-economic characteristics of the smallholder farm sector, interaction of the socio-economic factors and smallholder key technical constraints. Analysis of the demographic and socio-economic characteristic was mainly descriptive with the aid of tables, histograms and bar charts. The interaction of the socio-economic variables was determined on the basis of correlation and logistic regression model. Interaction of variables was undertaken to screen the variable for consideration in the empirical model of the study. Logistic regression results comprised of key technical constraints affecting market access namely: information, total assets, total income and extension assistance.

7.3 Policy implications

The production processes by smallholder farmers must take into account the challenges and opportunities resulting from the globalisation of agri-food markets. If meaningful smallholder development is to take place, policy makers must implement strategies which take into consideration constraints affecting smallholder farmers. In this case, policies must incorporate: production and marketing information, credit facilities, title deeds, contracts and production of export commodities, among others.

In this study, the fact that farmers who needed credit were constrained of farm equipment underlines the importance of credit. The implication is that lack of credit facilities entails lack of farm equipment. Therefore, credit is crucial in terms of ensuring the capacity in smallholder transformation from traditional agriculture to modern agriculture. Taking cognisance of the fact that most smallholder farmers fail to access credit when they need it calls for attention by policy makers. In addition, the private sector financial institutions can also play a complementary role by putting in place organisation policies which facilitate access by smallholder farmers. For instance, depriving farmers of access to credit on the basis of lack of title deeds might impact on many smallholder farmers who are still operating on state owned land. As such organisational policies must consider smallholder farmers' circumstance. Possibly, enhancing access to credit facilities by lowering barriers such as lack of title deeds would help smallholder farmers without title deeds to state land they occupy. Alternatively, measures should be put in place that enables smallholder farmers to acquire title deeds.

Farmers in this study lack market access due to lack of production and market information. Both production and market information is crucial in farming as highlighted in the literature. Lack of information in smallholder farming is a challenge to both the private and public sector. Measures should be put in place to ensure that support services such as extension do not operate exclusively in certain communities. Information given to farmers should not only be restricted to "*how to produce*" and "*where to sell*" but should relate to the dynamics of the modern supply chain requirements. Information regarding profitable activities such as value addition is important in ensuring increased income in smallholder farming. Information which enables smallholder farmers to meet food safety, quality, environmental and social standards is necessary. In this respect, it is necessary to develop skills necessary for grading and maintenance of quality standards. Extension officers must be conversant with such skills to be able to disseminate them to farmers.

The majority of farmers in the study lack title deeds to the land where they carry out their farming activities. Although the variable does not directly affect market access, security

of tenure is one of the most crucial factors determining farm development. The fact that the majority of farmers indicated that they carry out farming activities on state land is of concern. While there are indications that the issuing of title deeds is underway, most farmers are skeptical. This state of affairs is something which policy makers must prioritise when addressing problems affecting smallholder farmers.

Farmers in this study market their produce within a 300km radius. Market access should not be limited to local markets. Policy makers should put in place support measures (such as marketing agencies) that enable smallholder farmers to produce export oriented products as well as equipping them with knowledge in order to fully explore these markets. Perhaps with the help of extension assistance, smallholder farmers should be encouraged to produce export oriented produce such as citrus, given the viability of the enterprise in the valley. However, producing export oriented commodities requires adequate training and support.

There are no farmers in this study involved in contract farming. Although contract farming is not compulsory for market access, it plays an important production and marketing role in smallholder farming given the scale of operation. Measures should be put in place which facilitate the organisation of smallholder contracts with private sector players, in both input and output markets. This entails facilitating contracts between smallholder farmers and the private sector to ensure that farmers' requirements regarding production and market access can be taken care of.

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APPENDIX 1

FACULTY OF SCIENCE AND AGRICULTURE
Department of Agricultural Economics and Extension
University of Fort Hare

FARMER QUESTIONNAIRE ON PROJECT INVESTIGATION ON TECHNICAL
CONSTRAINTS TO SMALLHOLDER AGRICULTURE: CASE STUDY OF NKONKOBE
MUNICIPALITY, EASTERN CAPE,
SOUTH AFRICA.

Date: DD - MM - YYYY

Questionnaire no:

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Mobile: +27-73 083 4483

Email: peeepeepote@yahoo.com

INSTRUCTION: Ask to speak to the farmer, i.e. the person responsible for the day-to-day activities of the field plot(s).

GENERAL INFORMATION

a) Name of interviewee	
b) Location	
c) Name of the Village	
d) Telephone/Cell number/ Postal Address	
e) Time taken for the interview	
f) Place interviewed	

A. DEMOGRAPHIC INFORMATION OF HOUSEHOLD

A.1. Gender of household head	Male	1
	Female	2

A.2. Age of household head in years		Years
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A.3. Marital Status	Single	1	Married	2	Divorced	3	Windowed	4
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A.4. Household size		
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A.5. Level of education	≤ Grade 7	1
	Matric	2
	Post-matric	3
<i>Specify</i>	Other	4

A.6. Occupation (apart from farming)	
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B. LAND AND AGRICULTURE

B.1.Type of farming (Name one)	Crops - Irrigation	1
	Crops - Dryland	2
	Livestock	3
<i>Specify:</i>	Mixed	4
	Fruit Irrigation	5

B.2.Soil type:	Sandy	1	Clayey	2	Loamy	3	Other	4
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B.3.How did you acquire the land? (Can tick more than one)

Bought (Title deed)	1
Leased	2
Inherited	3
Given by government	4
Allocated by the headman	5
Renting and/or share cropping	6
Other (Specify)	7

B.4. May you please complete the table below.

Fields put under cultivation per season	Area (units to be indicated)	1
Field 1		2
Field 2		3
Field 3		4
Field 4		5
Field 5		6
Other		7

B.5.Are you satisfied with the size of land that you have?	1	Yes
	2	No
Why?.....		

B.6.Do you really feel secure with land that you have in terms of ownership?	1	Yes
	2	No
Why?.....		

Livestock Enterprise

B.7.Domestic animals on the farm

Animals	Use	1
Cattle		2
Goats		3
Pigs		4
Sheep		5
Poultry		6
Others (Specify):		7

C. HUMAN CAPITAL ENDOWMENTS

Knowledge – farming experience

C.1. How long have you been farming?		Years
C.2 How long have you been farming on your current farm?		years
C.3 How long have you been farming with the current enterprises?		years
Crops – Dryland		years
- Irrigated		years
Livestock		years

Farmer Qualities

Qualities	Question	Always	Sometimes	Never
C.5 Leadership	How often do you take risks in trying new techniques?	1	2	3
C.6 Motivation to progress	Do you help other farmers in farming?	1	2	3
C.7 Need for autonomy	Do you consult others before making a decision?	1	2	3

Planning skills

C.8 To what extent do you plan for the future?	Always	1
	Sometimes	2
	Never	3

C.9 How long in advance do you think it is necessary to plan?

>3 months	1	3 – 6 months	2	6 – 9 months	3	9-12 months	4	1year>	5
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C.10 Resource utilization – Farm Enterprise Diversification

C.11 Are you involved in any other farm activities, apart from growing crops and keeping animals? (e.g., value addition).	1	Yes
	2	No
C.12 Specify (if “Yes”).....		

C.13 Do you find such farm activities profitable?	1	Yes
	2	No

C.14 What missing resources would you need that you consider useful in improving your enterprise? (Fill the blank space below where appropriate)

Technique specification	Livestock enterprise	Crops enterprise	Fruits (Citrus)
Technical Inputs			
Technical information			
Technical equipment			
Technical Infrastructure			

D. INFRASTRUCTURE AND CAPITAL

Available equipment

D.1. May you please indicate any 5 most important technical equipment that you use for both farm production and marketing.

Type of asset	Condition (e.g. poor, good etc.)	Quantity	Age (years)	Estimated value (R)

Financial constraints

Question	Yes	No
D.2. Do you need credit?	1	2
D.3. Do you access any production loans?	1	2
D.4. Have you ever been denied grant production loan?	1	2

D.5.If you have access from where do you acquire the loan?	commercial banks	1
	agricultural cooperatives	2
	Other (<i>Specify</i>)	3

D.6.If 'No' on 'D.4' what were the reasons?	Lack of invoices what has been sold	1
	Non residency of the community	2
	Lack of a performing account	3
	Lack of security (physical assets -farm machinery and livestock)	4
	Other (<i>Specify</i>)	5

Technical inputs

Fertiliser usage

May you please fill the table below?

D.7. Do you use fertilizers when growing crops?	Yes	1	No	2
Options	Inorganic	Organic	Both	
D.8. Types used	1	2	3	
D.9. Type preferred and why?	1	2	3	
D.10 Reason				

D.11.Do you get these/this fertilizer(s) readily available?	Yes to 1 only	1
	Yes to 2 only	2
	Yes to 3	3
	Not at all	4

D.12.If 'No' on D.7, what are the reason(s)?	Lack of finance	1
	Delivery problems (e.g. poor transport network)	2
	Not available on the market on time	3
	Other (<i>specify</i>)	4

Labour usage

Question	Yes	No	Number of labourers	Days per year
D.13.Do you employ permanent labour on your farm?	1	2		
D.14.Do you employ seasonal or casual labour?	1	2		
D.15Are you satisfied with the number of labour that you employ?	1	2		

D.16.Where do you obtain labour? (Can tick more than one)

Family labour	1	Hired labour	2	Help from neighbours	3	Others:	4
---------------	---	--------------	---	----------------------	---	---------	---

D.17 Are you satisfied with the quality of labour that you employ?	1	Yes
	2	No

Technical information

D.18. How do you for obtain information about your output prices?

Radio	Television	Newspapers	Internet	Extension	Friends	Other :
1	2	3	4	5	6	7

D.19. Are you a member of National Farmers Union (NAFU)?	1	Yes
	2	No

D.20. If 'Yes' on D.19, are you satisfied with NAFU in terms of technical information provision?	1	Yes
	2	No

D.21. Do you attend workshops to learn about farming practices?	1	Yes
	2	No

Technical knowledge

D.22. Have you ever experienced the problems of soil erosion?	1	Yes
	2	No

D.23. If “Yes” on D.22, what measure have you put in place to prevent loss of soils? (Tick appropriate)

<u>Measure</u>	<u>Examples</u>	
Mechanical measures	Use of share ploughs or tine implements to create a coarse or cloddy soil surface;	1
Organic measures	Cover crops, or the strewing of crop residues or other organic matter on the surface;	2
Stubble cultivation	Leaving stubble on the surface;	3
Strip cultivation	Leaving the previous season’s crop standing, or cutting off high when harvesting and planting between the old rows.	4
Other (Specify)		5
None		6

Technical skills

Fire Prevention and Safety on the Farm

D.24. How best do you prevent fire from destroying your farm? (Can tick more than one)

Fire extinguishers	1
Conducting regular fire drills	2
Minimizing hazards on site (<i>e.g. extreme care when handling gasoline</i>)	3
Keeping things clean and in good repair (<i>e.g. Test your fire or smoke alarm system at least once a year.</i>)	4
Winter ploughing	5
Other (<i>specify</i>)	6

Technical equipment

Ploughing equipment

D.25. Amongst the following which ploughing equipment do you use to till the land?

Tractor	1
Animal drawn	2
Hoes	3
Other (<i>Specify</i>)	4

Cattle inputs

D.26. Do you own or have access to a milking palour?	Yes	1
	No	2

D.27.What do you use for milking of cows?	Human labour	1
	Milking machine	2

D.28.What would you prefer to use in milking the cow?	Human labour	1
	Milking machine	2

E. RESOURCES

Land-use

E.1.What crops/fruits have you produced in the past 12 months?	Crops/fruits	Area	Units	Quantity	Income
1.					
2.					
3.					
4.					
5.					
6.					

E.2.What livestock sales (including poultry) have you made in the past 12 months?

Indicate livestock type	Quantity	Price	Total revenue
1			
2			
3			
4			
5			
6			
TOTAL			

E.3. Apart from farming, are there any other sources of farm income?	Yes	1
	No	2

E.4. If “Yes on E.3” may you please indicate the sources on the table below?

Sources:1
2
3
4
5

E.5. In which category is your income from other sources? (To date)

Category A (in Rands)	0 – R500	1
B	501 – 1000	2
C	1001 -5000	3
D	5001 – 10000	4
E	10001 -15000	5
F	15000>	6

Extension services**E.6. Who amongst the following provides you with farming advice (basic support structures)?**

Government agricultural extension workers	1
Private extension workers (extension officer of FNB)	2
Development agencies	3
Friends (Other farmers)	4
Other (<i>Specify</i>)	5

E.7. Have you ever received any technical assistance from extension workers

Yes	1
No	2

E.8. How often do extension officers visit your farm?

Once a week	1
Once a fortnight	2
Once a month	3
Twice a month	4
Never	5
Other (<i>Specify</i>)	6

E.9. How in your opinion do you view the quality of the extension officers who visit you?

Excellent	1
Very good	2
Satisfactory	3
Poor	4
Very poor	5

F. MARKET ACCESS**F.1 Do you produce surplus of produce?**

Yes	1
No	2

F.2 How often do you produce surplus?

Always	1
Sometimes	2
Never (if no on F1)	3

F.3 When you produce surplus, what do/would you use it for? (Can tick more than one)

Give it to a neighbour (Specify reason)	
Sell it at the farm	
Sell it by the road side	
Sell it to a local shop	
Sell to a nearest shop	
Sell it to overseas markets	
Sell it to a nearest town	
Other: specify	
F. 4 Why (for F3).....	

F. 5 How far is it to get to your main market? State in km		
--	--	--

F.6 Do you have any problem(s) with getting your produce sold?	Yes	1
	No	2

F.7 If “yes” on F6 state the problem(s)? (Fill the table below)

1)
2)
3)
4)
5)

F.8 Is there any produce that you could not sell in the past?	Yes	1
	No	2

F. 9 Name the product and the reason? (If yes on F8)

Product	Reason
1)	
2)	
3)	
4)	
5)	

Thank You!!!

APPENDIX 2

Results of Log-Likelihood Iterations

Steps	Log-likelihood Values	
	First Model Run	Final Model Run
0	-28.137	-28.137
1	-18.118	-19.099
2	-13.109	-14.902
3	-11.809	-14.121
4	-11.466	-14.008
5	-11.433	-14.004
6	-11.433	-14.004
7	-11.433	-14.004
8	-11.433	

Source: Field Survey, 2007

APPENDIX 3

Goodness-of-Fit Tests

Method	Chi-Square	Degrees of Freedom	P-Value
Pearson	3.936	4	0.415
Deviance	4.530	4	0.339
Hosmer-Lemeshow	2.580	3	0.461
Brown:			
• General Alternative	0.092	2	0.955
• Symmetric Alternative	0.058	1	0.810

APPENDIX 4

Association between the response variable and predicted probabilities

Pairs	Number	%	Summary Measures	Value
Concordant	570	89.2	Somers' D	0.86
Discordant	20	3.1	Goodman-Kruskal Gamma	0.93
Ties	49	7.7	Kendall's Tau-a	0.17
Total	639	100		