

**Small-scale mango farmers, transaction costs and changing
agro-food markets: evidence from Vhembe and Mopani
districts, Limpopo province**

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the Master's Degree in Economics in the Department of Economics,
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DECLARATION

I, the undersigned, hereby declare that the work contained in this mini-thesis is my original work and that I have not previously submitted it at any other university for a degree.

Signature_____

Date_____



KEY WORDS

Small-scale farmers

Transaction costs

Informal agro-food markets

Market barriers

Mango value chains

Mango processing

Regulatory standards

Purposive sampling

Binary logistic regression model

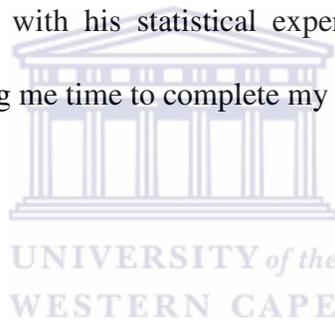
Limpopo province



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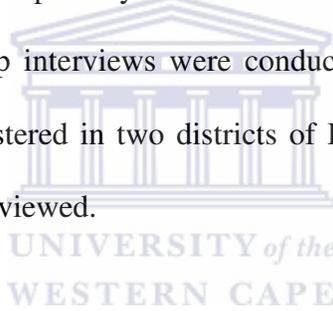


LIST OF ABBREVIATIONS AND ACRONYMS

ARDC	Agricultural and Rural Development Cooperation
CASP	Comprehensive Agricultural Support Programme
DAFF	Department of Agriculture, Fisheries and Forestry
DBSA	Development Bank of South Africa
EU	European Union
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GDPR	Gross Domestic Product per Region
HDI	Human Development Index
LDA	Limpopo Department of Agriculture
LEGDP	Limpopo province Employment Growth Development Plan
LRAD	Land Redistribution for Agricultural Development
MEC	Member of Executive Council
NDA	National Department of Agriculture
NIDS	National Income Dynamics Income Study
PGDS	Limpopo Provincial Growth and Development Strategy
PROVIDE	Provincial Decision-Making Enabling Project
PTO	Permission to Occupy
SAMGA	South African Mango Growers Association
StatsSA	Statistics South Africa
TCE	Transaction Cost Economics
USA	United States of America
USDA	United State Department of Agriculture

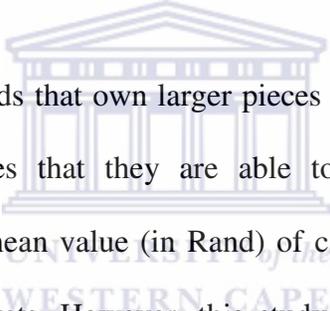
ABSTRACT

The main objective of this study was to identify ways in which transaction costs can be lowered to improve small-scale farmers' participation in and returns from agricultural output markets, with specific reference to small-scale mango farmers in Limpopo province. This study hypothesizes that transaction costs are lower in informal spot markets and increase when small-scale farmers sell in more structured markets (formal markets). This study builds on transaction cost economics (TCE) to demonstrate how to overcome transaction cost barriers that small-scale mango farmers face in the agro-food markets. The approach to collect primary information was sequenced in two steps: first, key informant and focus group interviews were conducted and, secondly, a structured survey instrument was administered in two districts of Limpopo. A total of 235 small-scale mango farmers were interviewed.



A binary logistic regression model was used to estimate the impact of transaction costs on the likelihood of households' participation in formal (=1) and informal (=0) agro-food markets. STATA Version 10 was used to analyse the data. This study found that a larger proportion of male than female farming households reported participation in the formal markets, suggesting deep-seated gender differentiation in market participation. The average age of small farmers participating in formal markets is 52, compared to 44 for those in informal markets, implying that older farmers might have established stronger networks and acquired experience over a longer period. Farmers staying very far from the densely populated towns (more than 50 km) participate less in the formal markets than those staying closer (0 – 25 km and 26 – 49 km), which implies that the further they are

from the towns, the less the likelihood of farmers selling in the formal markets. Farmers who own storage facilities and a bakkie (transportation means) participate more in formal markets compared to those who do not own these assets, which suggests that these farmers are able to store mangoes, retaining their freshness and subsequently delivering them to various agro-food markets on time. Households that participate in formal markets have high mean values of income and social grants. However, this study found that the likelihood of a household's participation in the markets is less as income and social grants increase. This suggests that households do not invest their financial assets in order to overcome market access barriers.



A large proportion of households that own larger pieces of arable land participate in the formal markets, which implies that they are able to produce marketable surplus. Households that have a high mean value (in Rand) of cattle participate more in formal markets than in informal markets. However, this study found that the likelihood of a household's participation in the markets does not change with an increase in the value of its livestock. These findings suggest that households do not sell their cattle in order to overcome market access barriers. Reduced transaction costs for small-scale mango farmers in Limpopo should improve their participation in and returns from the agro-food markets. Policy interventions to support this need to focus on: access to storage and transportation facilities, enforcement of gender equity requirements in existing policies, and better access to information about markets.

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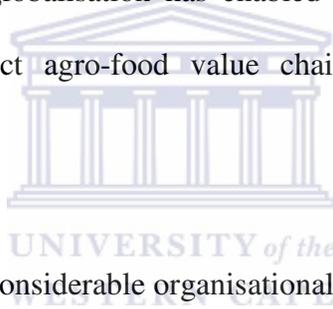
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CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1. Introduction

Over the past two decades, agro-food markets have undergone dramatic changes due to various factors (Gow and Shanoyam, 2010). For example, higher incomes earned and increasing participation by women in the labour force have resulted in greater demand for high-value processed food (Pingali, Khwaja and Meijer, 2005). Moreover, urbanisation has increased the scope for economies of scale in agro-food supply and distribution (Pingali *et al.*, 2005), while globalisation has enabled transnational and multinational supermarket chains to connect agro-food value chains across different continents (Bordewijk, 2006)



This restructuring also entails considerable organisational and institutional transformation throughout the agro-food value chain (Pingali *et al.*, 2005). Supermarkets and agro-food processors, for instance, set rules for farm production and certify standards for the agro-foods they buy and sell. While this context might open new opportunities along the agro-food value chains, it could also subject farmers to increased risk in terms of uncertainty with regard to market access, price instability and net incomes (Bordewijk, 2006).

Farmers who have succeeded in overcoming new market access barriers have reaped benefits. However, not all farmers have access to the indispensable resources needed or the capabilities to take advantage of the opportunities presented and thus face the risk of exclusion from output markets (Gow and Shanoyam, 2010). Small-scale farmers face

high costs of exchange, which make it difficult for them to access and participate in the markets. Magingxa and Kamara (2003), among others, argue that some market access barriers are rooted in a lack of market awareness and insufficient understanding of how agro-food markets operate. Resource-poor small farmers often do not have access to relevant and accurate information on prices, the locations of effective demand and the preferred quality of horticultural produce. How would they be able to transact effectively and efficiently without access to this crucial market information?

This study contributes to a better understanding of the ways in which small-scale farmers' link with various agro-food markets and how this impacts on their livelihood strategies and well-being. Its main concern is with isolating the nature and extent of transaction costs in mango output markets, separating formal and informal markets. This is a critical first step to lower the costs that often restrict participation in markets with a higher return. To narrow the scope of the study and gain more realistic insights with meaningful policy implications, this case study concentrates on the small farmers in the mango value chain farming in two districts of Limpopo province, namely Mopani and Vhembe.

1.2. Research context and background

According to Pingali *et al.* (2005), changes in the agro-food marketing system have raised the costs of exchange for both staple and high-value crop producers in two ways. Firstly, there are increased costs of production stemming from the various investments needed to meet the requirements of the output market, e.g. investment in production

technology such as fertilizer programmes, post-harvest technologies such as storage facilities, transportation, etc. Secondly, there is a greater depth of integration along the agro-food value chain, but this is unavoidably costly. These transaction costs form a significant variable that can inhibit the small-scale farmers' market participation (Pingali *et al.*, 2005).

Studies generally deal with the nature and magnitude of transaction costs that small-scale farmers face. Hobbs (1997), among others, focused on transaction cost analysis for the choice of marketing channel in the United Kingdom's beef retail sector. This study concluded that transaction costs are the most important factor that influences the farmers' choice of marketing channel and vertical co-ordination mechanism.

Makhura (2001) also studied the impact of transaction costs on small-scale farmers' participation in the output markets in the Northern Province (Limpopo province). He concluded that transaction costs are not only important in influencing the choice of marketing channel, but also significant in determining the level of sales in the output markets. Moreover, farmers are faced with high transaction costs that limit their participation in the output markets.

Jagwe, Ouma and Machethe (2010) studied the transaction costs faced by banana farmers in Burundi and Uganda. The findings of their study also indicate that transaction cost variables have a negative influence on the likelihood and intensity of farmers' participation in the markets. More specifically, their study indicates that transaction costs

inhibit farmers' participation in the output markets. Overcoming transaction costs is critical to enable small-scale farmers to participate better in output markets, since they influence the choice of marketing channel and level of market participation.

This study used qualitative and quantitative methods to investigate the likelihood of small-scale farmers' participation in the formal and informal markets, given a set of transaction cost variables. As far as the author is concerned, there are limited studies in South Africa investigating the transaction costs specifically faced by small-scale farmers producing highly perishable commodities such as mango. Pingali *et al.* (2005) argue that transaction costs are commodity specific, and that small-scale farmers who produce highly perishable commodities are likely to experience higher transaction costs compared to those who produce commodities such as grains, which have a longer shelf life. The assumption underlying this study is that small-scale farmers' participation in the markets, particularly the formal markets, is associated with higher incomes. Thus, improving the participation in these markets by small-scale farmers is likely to improve their living conditions.

1.3. Statement of the research problem

Small-scale mango producers in Limpopo province (Vhembe and Mopani districts) sell their mango produce in different markets, ranging from informal to highly structured markets (formal markets). In less structured markets they confront almost zero barriers to market entry and exit. By contrast, more structured market transactions might expose them to various barriers: a high degree of integration between producers and output

markets, strong regulations on quality and safety standards regarding their produce, etc. Resource-poor farmers are often unable to overcome such barriers. These barriers manifest in transaction costs along the mango value chain: ranging from the cost to locate willing buyers to post-contractual monitoring costs. In more rewarding agro-food output markets (in terms of sales volumes and returns), however, small-scale farmers often face higher transaction costs. This is arguably the primary reason for their low participation in agricultural output markets. Therefore an intervention is required to lower transaction costs so that the small-scale farmers' participation in and returns from agricultural output markets are improved. How this can be achieved is the research agenda for this study.

1.4. The main objective

- To identify ways in which transaction costs can be lowered to improve the small-scale farmers' participation in and returns from the agricultural output markets, with specific reference to small-scale mango farmers in Limpopo province.

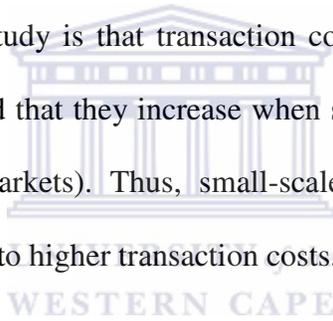
1.4.1. Secondary objectives

- To identify small-scale mango farmers in Limpopo province (Mopani and Vhembe districts).
- To identify the different marketing channels available to small-scale mango farmers.
- To estimate the extent of small-scale mango farmers' participation in agro-food markets (formal and informal)

- To identify the transaction cost variables influencing small-scale farmers' participation in agro-food markets.
- To estimate the extent to which transaction cost variables affect small-scale farmers' participation in agro-food markets (formal and informal markets)
- To recommend mechanisms to improve small-scale farmers' participation in formal agro-food markets.

1.5. Research hypotheses

The main hypothesis of this study is that transaction costs are lower in less structured markets (informal markets) and that they increase when small-scale farmers sell in more structured markets (formal markets). Thus, small-scale farmers' participation in the formal markets is lower owing to higher transaction costs.

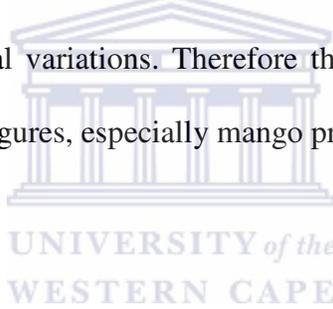


Specific hypotheses:

- Small-scale farmers participate more in the informal markets and less in the formal markets due to transaction cost barriers.
- Reduced transaction costs increase the likelihood of households' participation in the formal markets.

1.6. Limitations of the study

There are various data limitations to this study. The study lacks information related to the mango varieties produced by small-scale farmers in the study areas. Although important, this information does not thwart the achievement of the objective of this study. This study also acknowledges the existence of power relations along the agro-food value chain and focuses only on one end of the value chain, i.e. small-scale mango farmers. As such, the unit of analysis in this study is small-scale mango farmers (or households producing and selling mangoes). Mango is a seasonal commodity; consequently, mango sales differ across seasons. However, due to a lack of resources it was impossible to acquire enough information to capture seasonal variations. Therefore the information presented in this study is aggregated to annual figures, especially mango production and sales.



1.7. Delimitations

This study was conducted in two districts of Limpopo province, Mopani and Vhembe, which together form the hub for subtropical commodities in South Africa. Small-scale mango farmers producing different types of mango varieties/cultivars were included to capture the extent of their participation in agro-food markets. Some mango varieties are not ideal for consumption as fruit (while others are). Farmers therefore sell these mangoes to agro-food-processing factories, such as atchar factories. Although this does not allow enough room to conclude that mango varieties of type x are mostly sold in market y , it gives enough information to estimate small-scale farmers' general participation in the markets.

To overcome the problem of variations in terms of seasonality and the types of markets used by small-scale farmers, this study combines the different types of markets accessed by small-scale farmers into two groups: firstly, informal markets, which include different types of informal arrangements that exist between buyers and seller in these markets. Such markets are characterised by a lack of *ex ante* and *ex post* relations between the participants, e.g. informal trading, bakkie trading, selling to consumers at the roadside, etc. Secondly, formal markets involve more formal arrangements, which normally involve established contracts between the participants. Such markets include agro-processing industries (mango juice, atchar and dried mango), supermarkets, etc.

1.8. Contribution of this study

Most studies conducted in South Africa on the topic of transaction costs covers agricultural commodities that are not highly perishable e.g. grain and livestock. Pingali *et al* (2005) stated that transaction costs can also be commodity specific. Therefore this study aims to extend transaction costs analysis to highly perishable horticultural commodity to investigate the nature and extend of transaction costs and their impact on market participation. Secondly, through carefully integrating qualitative and quantitative research methods, this study builds a unique database of small-scale mango farmers in two districts of Limpopo province (Mopani and Vhembe districts).

Thirdly, other studies focus on the probability of small-scale farmers' participation in the markets and factors that influence their decisions on market participation. This study extends this body of work by carefully documenting the experiences of small-scale farmers actively selling in different agro-food output markets. As such, this study estimates determinants behind the participation of resource-poor farmers in formal and informal mango value chains and markets. A key recommendation derived from our findings is the need for interventions to reduce transaction costs that would enable the participation of small-scale farmers in the market, enhance sustainable returns, reduce vulnerability to shocks and improve human well-being.

1.9. Outline of chapters in this study

In this chapter we have summarised the background to and scope of this study. More specifically, we described the research problem and questions, stated the hypotheses to be tested and highlighted the main contributions to the existing body of research. Chapter 2 outlines the economy of Limpopo province and focuses specifically on the pathways of economic development, livelihood and living standards and the position of the agricultural sector in the province.

Chapter 3 discusses the mango industry (global and local trends) and addresses the following three basic questions on global trends: who are the leading mango-producing countries in the world? What are the trends in mango trade in recent years? And lastly, what is the position of small-scale farmers in the global mango value chain. In relation to domestic mango trends, this chapter asks the following questions: who are the leading

producers of mangoes in South Africa. What markets exist for mangoes? What is the position of small-scale farmers in the domestic mango value chain?

Chapter 4 outlines the conceptual framework of this study. The chapter uses transaction cost economics to build a conceptual model to study problems related to the participation of small-scale farmers in agro-food markets. Chapter 5 outlines the methodology of the study, with the qualitative and quantitative methods used in the study being outlined in a systematic way. Chapter 6 discusses the analysis and results of this study. Chapter 7 draws on the insights from this study to draw conclusions and make recommendations.



CHAPTER TWO: LIMPOPO PROVINCE ECONOMY AND AGRICULTURAL SECTOR

2.1. Introduction

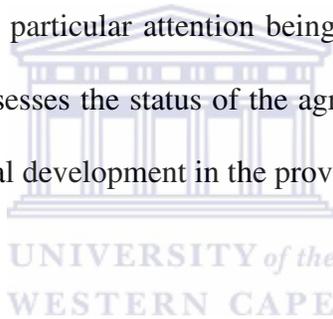
About 10,9% of the South African population (approximately 5.2 million people) resides in Limpopo province, which is the fourth most populous province after Gauteng, KwaZulu-Natal and the Eastern Cape (Statistics South Africa, 2010). The Limpopo province is divided into five district municipalities, namely Vhembe, Mopani, Capricorn, Greater Sekhukhune and Waterberg. About 89% of Limpopo is rural, and it is the poorest province in South Africa (Lahiff, 2000; Leibbrandt, Woolard, Finn & Argent, 2009). The three former homelands of Lebowa, Gazankulu and Venda formed Limpopo following the institutionalisation of political democracy in South Africa in 1994.

According to Cartwright, Gastrow, Lorentzen and Robinson (2009), the apartheid spatial settlement patterns restricted large numbers of people to living in rural Limpopo. This legacy of inherited underdevelopment of rural homelands remains a formidable development challenge today. Lahiff (2000) argues that the extreme poverty and underdevelopment in the former homelands results from social and class segregation. This suggests that the historic neglect of economic and social development in Venda and other former homelands continues to shape household livelihoods in post-apartheid Limpopo.

The official provincial pro-poor development strategy acknowledges the existence of poverty, inequality and unemployment, and provides a framework within which to deal with these problems. It further identifies agriculture, tourism and mining as “three pillars”

on which to premise future provincial development (LEGDP, 2009). However, critical analysis reveals that agriculture's share of the provincial economy has fallen in recent years, and this raises questions about how to restructure the sector to be a powerful engine to propel socio-economic development.

This chapter is divided into three sections: The next section reviews trends in Limpopo's macroeconomic performance, looking specifically at the dynamics around economic growth and the sectoral composition of the provincial economy. The second section assembles information about the livelihoods and living standards of the population living and working in Limpopo, with particular attention being paid to livelihood strategies in rural areas. The last section assesses the status of the agricultural sector in the province, arguing for pro-poor agricultural development in the province.



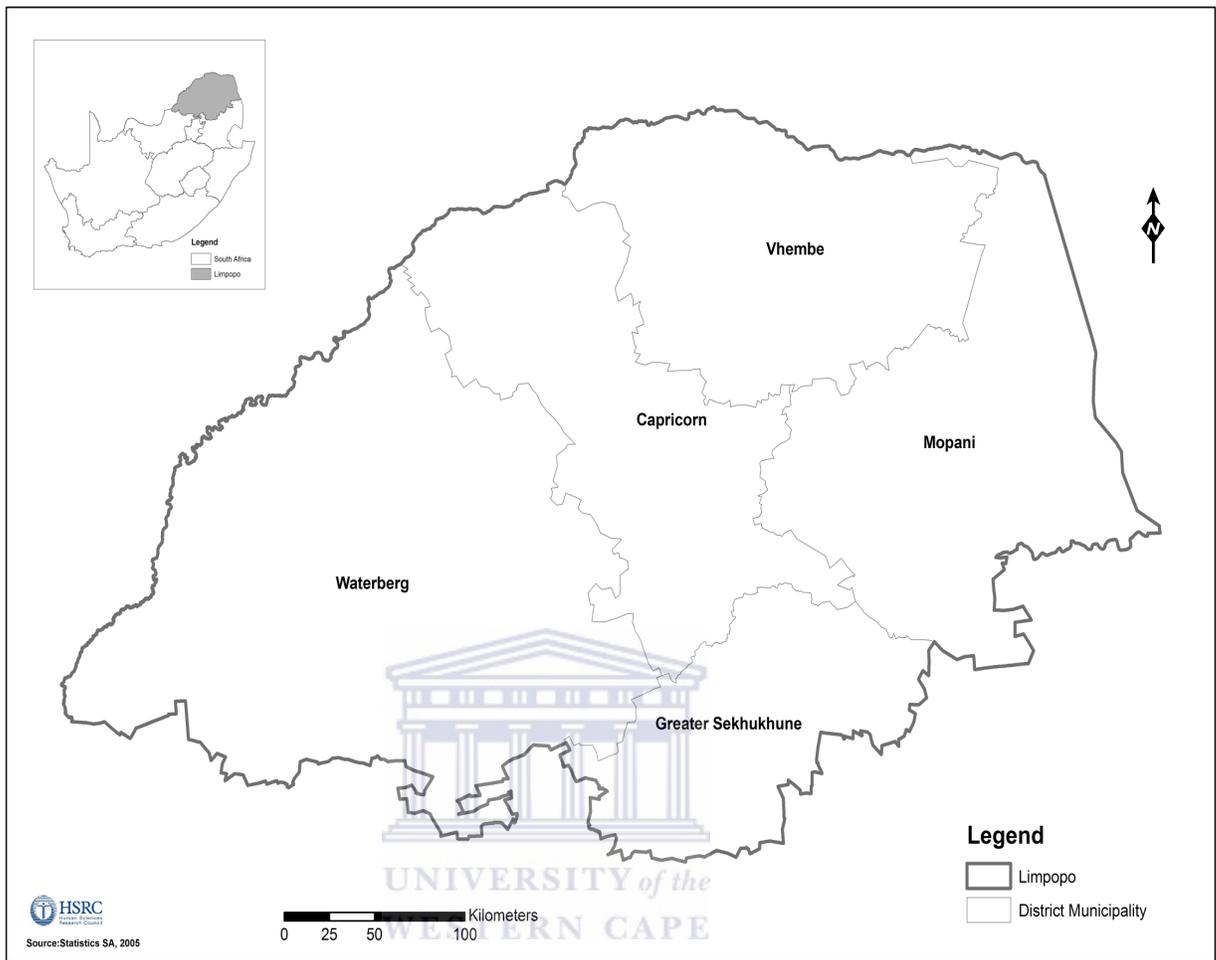


Figure 1: Map of Limpopo province showing the five district municipalities.
Source: Human Sciences Research Council (2010)

2.2. Economic development pathways in Limpopo

This section presents an overview of Limpopo’s economic performance and the sectoral composition of the province’s economy, drawing mainly on official post-1994 data. After the democratic election of 1994 much-anticipated restructuring (through policy reforms and interventions) took place with the aim of bringing about the transition of one of the poorest regions in South Africa to a higher growth path. Between 1994 and 2008 there

was a dramatic change in the structure of the Limpopo economy, both in terms of composition and growth. Closer analysis of the provincial economic indicators reveals how Limpopo's economy compares with national economic growth and sectoral trends.

Recent phases of provincial economic growth, as illustrated in Figure 2.2, can be subdivided into three periods: erratic growth (1996–2003), steady expansion (2004–2007) and economic downturn (post-2007). Between 1996 and 2003, Limpopo's economy experienced an erratic wave-like growth pattern: it soared from 2% in 1996 to more than 7% in 1997, steeply sliding to less than 1% in 2000, followed by another wave of dramatic surge and decline up to 2003. Many factors influenced this severe instability, but activities tied to the mining sector account for a considerable part of the fluctuating growth. A total of some R24 billion worth of investment flooded into the province between 1996 and 2003, a large portion of which was poured into the mining sector. Output in the mining sector grew by more than 50%, from R4 m in 1996 to R18 m in 2003. However, in the same period Limpopo's economy experienced unstable output in the agricultural sector, which is one of the key sectors according to the LEGDP (2009), leading to upturns and downturns in the general trend in figure 2.

The period of steady expansion from 2003/04 to 2005/06 – phase 2 – was mainly the outcome of exceptional growth in the tertiary sector, with retail and wholesale trade experiencing growth of about 31%. The slowdown after 2007 basically followed the whole national economy slipping into recession. This is evident from the South African economic growth pattern, which also recorded a decline after 2006.

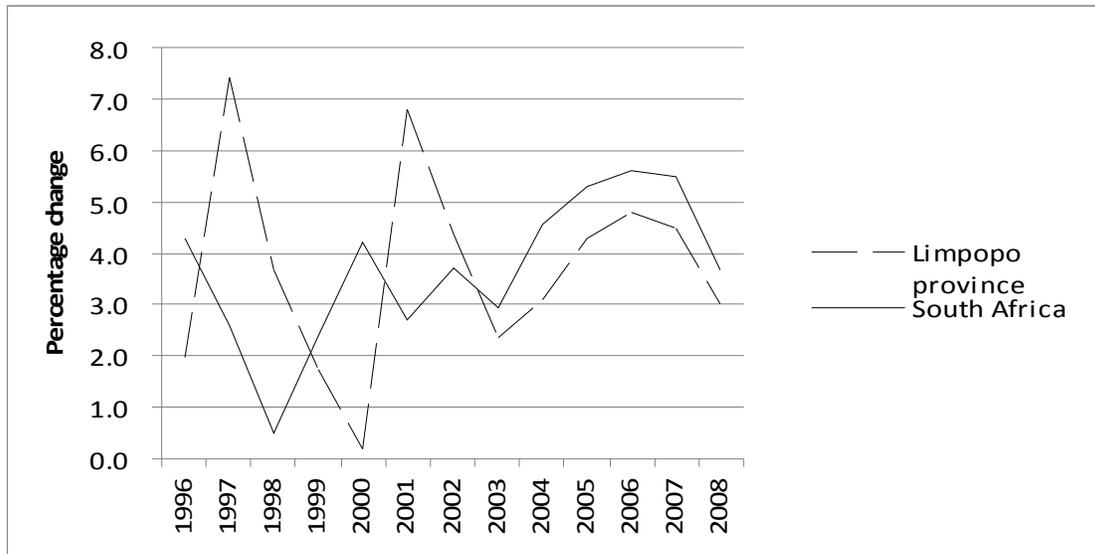


Figure 2: National and Limpopo province real economic growth rate, 1996–2008
Source: Statistics South Africa (various years)

Limpopo’s economy is dominated by the tertiary sector but, as highlighted above, it remains sensitive to fluctuations in the primary sectors. Between 1996 and 2009, the tertiary sector contributed more than 60% towards the provincial economic output. The contribution of the secondary sector was less than 20% in the same period. Primary industry (which includes agriculture) contributed less than the tertiary industry, but more than the secondary sector, with a contribution of more than 20% between 1996 and 2008. A closer analysis shows that, in 2007, the mining sector contributed 22.2% of provincial gross domestic product per region (GDPR), followed by general government services (18.3%), wholesale and retail trade (14.0%), business services (8.6%), finance and insurance (8.0%), transport (6.8%) and communication (4.6%) (Cartwright *et al.*, 2009).

Tertiary services have been driving Limpopo’s economy. Finance and insurance have contributed 8.9%; communication 6.7%; transport 6.9%; and wholesale and retail trade

4.6%. The agricultural sector contributed about 2.3% to Limpopo's GDP in 2007. The sector's position in relation to provincial GDP stands in contrast to its elevated status, as is evident from Limpopo's policy documents, in particular the provincial growth and development strategy (Limpopo Provincial Growth and Development Plan, 2004) and the Limpopo Employment Growth and Development Plan (LEGDP, 2009), which states that the province "enjoys a competitive advantage in mining, agriculture and tourism along the value chain of the sectors".

The growth and development strategy acknowledges the low contribution of agriculture to provincial economic output, but suggests that the sector is critical in Limpopo's future growth and development (Cartwright *et al.*, 2009). The provincial growth and development strategy of 2004 (Limpopo Provincial Growth and Development Plan, 2004) noted some limits to agricultural development. These relate mostly to low capacity and skills levels, weak co-ordination between and within institutions in the sector, and the lack of access to finance (including a decline in the departmental budget as a proportion of the provincial budget).

Tourism is also a sector that has been receiving attention in the policy documents of the province. In 2004 alone, the sector contributed about 4% towards the provincial output. However its potential is yet to be realised because its contribution towards the provincial economic output is still not significant (Cartwright *et al.*, 2009). Figure 3 shows sectoral contribution towards the economy of Limpopo.

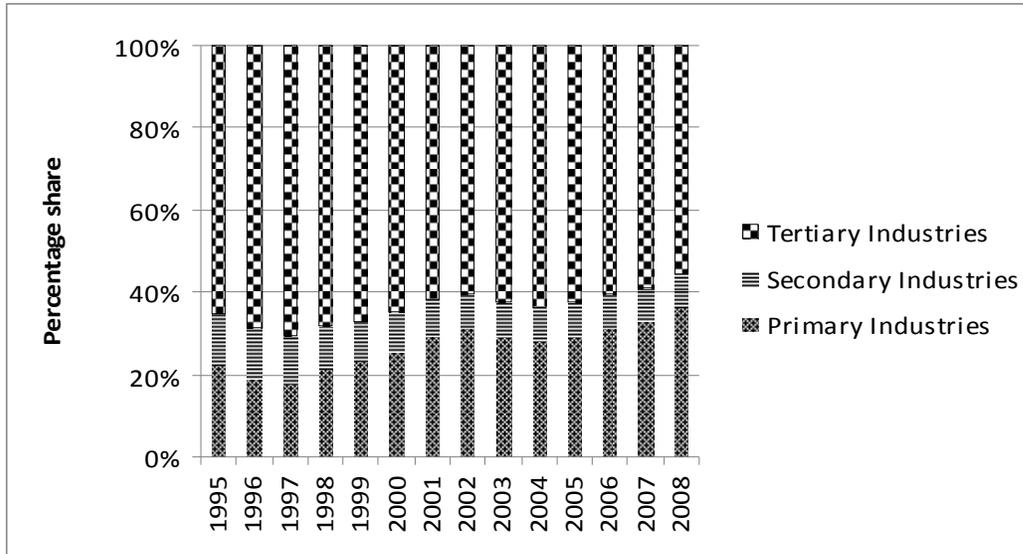


Figure 3: Sectoral contribution to Limpopo GDP, 1995-2008
Source: Statistics South Africa (various years)

Agriculture contributes less than 3% to South Africa's gross domestic product (GDP), and this contribution is set to decline as the economy develops. According to official data, Limpopo's agricultural sector is similar to the South African economy, but Limpopo's agricultural economy is dramatically different from the agricultural economies in other developing regions of sub-Saharan Africa.

2.3 Livelihood strategies and living standards

Rural households in Limpopo obtain a large part of their incomes and devote a significant part of their resources (especially labour) to non-farm activities (Ngqangweni & Delgado, 2002). More recently, it has been observed that the majority of rural households depend heavily on remittances from migrant workers, in-kind donations and social transfers (child and old-age support grants) from the government (PROVIDE, 2009). Household

incomes from agricultural activities are gradually becoming a smaller proportion of the household income portfolio, but Lahiff (2000) has underscored that the contribution of agriculture towards rural livelihoods in Limpopo could be underestimated.

Employment and livelihood strategies

The Limpopo Employment, Growth and Development Plan (LEGDP, 2009) highlights the importance of more inclusive economic growth, decent work and sustainable livelihoods. More specifically, the plan outlines the importance of creating decent employment as a drive towards improved income security and higher levels of human well-being. Official data shows that the unemployment rate in the province has remained above the national rate since the advent of the new democratic government. According to the strict definition, about 44% of the population of Limpopo was unemployed in 2005 compared to 26.4% at the national level (PROVIDE, 2005). However, in 2007 the estimated unemployment rate in Limpopo decreased to 34.5%, relative to national estimates of 23.6% (Cartwright *et al.*, 2009). The most recent analysis by the LEGDP (2009) reports declining unemployment trends between the second quarter of 2008 (30.6%), the first quarter of 2009 (28.1%) and the second quarter of 2009 (24, 9%).

Although this signals improvement in terms of the labour absorption capacity of Limpopo's economy, the question is whether or not the jobs created are sustainable. The LEGDP (2009) points out that the major problem with the labour market is closely related to the prevalence of the unskilled labour force in the province. Cartwright *et al.*

(2009) report that about 80% of the employed in Limpopo are in formal jobs, while 21,4% are in informal sector employment.

Limpopo's Growth and Development Strategy (Limpopo Provincial Growth and Development Plan, 2004) highlights the importance of agriculture in job creation. The DBSA (2005) reported that the agricultural sector in Limpopo had large multiplier effects and concluded that it was the only sector that recorded a comparative advantage within the province. This implies strong backward and forward linkages of agriculture and other industries.

Sectoral employment figures reveal that, despite agriculture's shrinking contribution to the provincial economy, it is still the second largest employer after manufacturing (with 14% and 15.7% in 2007 respectively). However, due to the seasonal and contractual nature of the employment on farms, agricultural employment could be underreported (Cartwright *et al.*, 2009). Detailed analysis reveals that, between 2000 and 2007 there was a dramatic decline in agricultural employment in Limpopo province. About 400 000 people were employed by this sector in 2000, and this declined to just over 50 000 in 2007 (PROVIDE, 2009).

The apartheid system deprived blacks in the former Bantustans (especially rural Limpopo) of natural resources (land) and skills (Low, 1986). This imposed a ceiling on potential incomes from farming or non-farming rural economic activities, which have remained inadequate and thus trapped rural dwellers in poverty (Lahiff, 2000). Rural

dwellers have thus been migrating to relatively higher-earning non-agricultural and urban jobs. Off-farm labour markets now shape household work incentives, labour allocation and livelihood strategies (Kirsten & Rwelamira, 2003).

The livelihood strategies of rural households consist of multiple sources of income, of which agriculture forms a relatively small share. Households derive their livelihood through different sources: production (farming, local craftwork, and small-scale industries), trading, and transfers (Perret, 2003). Although remittances form a significant part of livelihood strategies, their share of household income has been declining in recent years (Statistics South Africa, various years). Aliber (1998) estimated that agriculture contributed only 9% towards household income in Limpopo province, followed by pensions with 8%, other wage income at 13% and migrant remittances at 33%. A study by Kirsten and Rwelamira (2003) also revealed similar patterns in Limpopo, with agriculture's contribution recorded at only 6%, followed by pensions at 26%, remittances at 32% and wages and salaries at 46%.

Official data reveal the changing livelihood strategies of people in Limpopo. Table 2.1 shows the results of the South African General Household Survey (GHS) between 2003 and 2008. These results concur with other findings that also highlighted a declining share of farm income (primary income from commercial agriculture) in the households' income portfolios.

Table 2.1: Share (%) of households based on reported primary income source for SA and Limpopo, 2002-2009.

Year		Wages/salaries	Remittance	Pensions	Farm income	Other non-farm	No income
2002	Limpopo	39.5	26.56	25.88	1.79	5.54	0.74
	South Africa	59.4	15.53	18.17	0.96	5.22	2.72
2003	Limpopo	33.61	28.94	28.39	1.23	6.95	0.89
	South Africa	57.46	14.56	19.59	0.84	4.78	2.76
2004	Limpopo	32.96	30.36	27.84	1.11	7.04	0.69
	South Africa	56.15	14.21	21.5	1.02	5.59	1.53
2005	Limpopo	34.14	27.01	31.95	0.73	5.72	0.45
	South Africa	57.8	12	22.71	0.92	4.61	1.96
2006	Limpopo	37.41	29.94	32.37	0.76	3.74	0.78
	South Africa	58.52	10.81	24.1	1.29	3.06	2.22
2007	Limpopo	38.07	23.58	32.84	0.8	3.93	0.78
	South Africa	61.16	10.07	22.57	1.05	2.92	2.24
2008	Limpopo	42.16	20.82	32.57	0.68	2.24	1.54
	South Africa	61.92	9.53	23.74	0.73	1.95	2.13
2009	Limpopo	38.99	20.83	33.2	0.24	5.93	0.81
	South Africa	58.34	9.02	23.83	0.14	7.91	0.76

Source: Statistics South Africa (various years)

Two points emanate from the table above. Firstly, rural households rely on a mix of livelihood strategies. Secondly, formal agriculture's contribution towards livelihood strategies forms a small and declining share over time.

Out-migration to other provinces in search of better job opportunities is also a phenomenon in Limpopo. Cartwright *et al.* (2009) reported that Limpopo is a key migrant-sending province, especially from places in the former homelands. Kirsten and Rwelamira (2003) reported that about 32% of the total rural household income in Limpopo was derived from migrant wages outside the province. Lahiff (2000) also indicated that migrant wages formed an important source of income for households in the former homelands.

Generally, livelihood strategies in rural areas are still dominated by labour market incomes (wages) and transfers (social grants and remittances). The two sources of income differ importantly in two ways, however. Income transferred through payments or remittances does not generate additional activity through the backward linkages, as would locally produced output. Moreover, the prospects for growth in transfers or remittances are limited, highlighting the importance of increased locally produced output (Perret, Anseeuw & Mathebula, 2005). What this last point underscores is that the creation of sustainable jobs in Limpopo would have a multiplier effect that could sustain the provincial economy over a longer period.

Poverty and inequality in Limpopo province

The provincial employment, growth and development strategy (LEGDP, 2009) identifies addressing poverty and underdevelopment as one of the key strategic priorities over the next five years. More precisely, rural development, food security and land reform are set out as key areas of intervention to deal with poverty and underdevelopment, amongst other areas for intervention¹. However, what is not clear is how the intervention plan would work in practice.

According to the LEGDP (2009), approximately 40% of the households in Limpopo are located in areas that are characterised by extreme poverty and underdevelopment. Leibbrandt *et al.* (2009) reported the state of poverty and inequality in South Africa using

¹ The LEGDP draws attention to five strategic priorities outlined by the premier in the state of province address on 11 July 2009. Ensuring more inclusive economic growth, decent work and sustainable livelihoods; economic and social infrastructure; access to quality education; and improved health care are considered to be key areas of intervention.

data from the first wave of the National Income Dynamics Study (NIDS), a national household panel survey conducted in 2008. Using two poverty lines, one set at R502 and another at R924 per capita per month, they estimated the poverty incidence in Limpopo to be relatively high: at the lower poverty line, 63.9% of the population in Limpopo, reaching 80.3% at the upper poverty line. However, this is comparable with poverty rates for the Eastern Cape (62.7% and 80% at the respective poverty lines) and KwaZulu-Natal (62.8% and 80.3% respectively). In terms of its contribution to national poverty, this study found that poverty in Limpopo contributes roughly 13 to 15% to poverty in SA.

PROVIDE (2005) found that agricultural households (located in rural areas) are worse off in terms of income poverty when compared to the non-agricultural households in Limpopo. According to their data, based on a 2000 household survey, the average income for an agricultural household amounted to R20 833, compared to R28 773 for non-agricultural households. African agricultural households earned R14 186 and are far worse off than their white counterparts, who reported average income of R460 357. It is worth highlighting that these are household-level incomes, made up of incomes earned by multiple household members, and therefore not exclusively reflecting wages in the agricultural sector (PROVIDE, 2005).

Table 2.2 below shows selected living standards indicators for Limpopo between 2003 and 2007. In general, the Human Development Index – a composite living standards index based on education, health and per capita incomes – shows that the well-being of people in Limpopo has been improving in recent years: from 0.49 to 0.56. However, as

indicated before, income inequality measured in terms of the Gini coefficient has worsened: from 0.63 to 0.66. Fewer workers appear to be unemployed, but the provincial unemployment rates exceed national unemployment.

Table 2.2: Overview of human development measures in Limpopo province

Indicator	2003	2005	2007
HDI	0.49	0.52	0.56
Gini coefficient	0.63	0.61	0.66
Unemployment rate	51.8%	47.5%	34.5%

Source: LEGDP (2009)

The province's fifteen-year review (1994-2009) indicates that there has been gradual progress in improving the livelihoods of Limpopo citizens. Over the past 15 years, the Limpopo government has intervened through diverse ways to ease the challenge of poverty faced by its citizens. However, service delivery in terms of the provision of housing, water and sanitation, and electricity, remains poor and inadequate (Office of the Premier, 2009).

Table 2.3 shows indicators of selected social conditions in Limpopo. Cartwright *et al.* (2009) found that a combination of government programmes, remittances, social grants and high economic growth have contributed to gradually improving human development. More specifically, there has been an improvement in the number of people who are enrolled for primary school and in the medical practitioners-to-patients ratio, and a

decline in infant mortality and illiteracy rates. The discouraging picture is that of an increasing number of people who report receipt of government transfers.

Table 2.3: Indicators of selected social conditions in Limpopo province

Indicator	2004	2005	2006	2007
Infant mortality (deaths per '000 births)	41	39	38	37
Illiteracy	627 000	631 000	604 000	564 000
Primary school enrolment	1 898 273	1 706 754	1 709 792	1 706 127
Medical practitioners per 100 000		14.3	14.8	17.4
Child support grant	718 116	950 064	1 110 526	1 093 333
Old age grant	318 060	326 369	328 252	341 667

Source: Cartwright et al. (2009)

There are three points arising from the above section: firstly, the Limpopo economy has been improving in recent years and thus the poverty rate has been declining; however, income inequality has been increasing. Secondly, the living conditions of people in Limpopo have been improving, although there are a large number of individuals depending on government social grants. Thirdly, the agricultural sector's share towards provincial output is declining, although the province is predominantly rural.

2.4. Support for agricultural development

In this section the goal is to explore the role of agricultural development in helping to improve the living standards of rural residents in Limpopo. To begin to understand policy options to develop agriculture, it is necessary to start with typical information about the agrarian structure and agro-ecological potential. Agriculture in Limpopo, as is the case

with South African agriculture, is dualistic, which means that resource-poor small farmers co-exist alongside highly capital-intensive, large-scale commercial agriculture. This agricultural dualism is largely the result of the apartheid policies of the past that emphasised government support for white farmers while neglecting the small-scale black farmers. However, the 2005/2006 Strategic Plan of the Limpopo Department of Agriculture (LDA) noted successes in land reform and greater participation by black entrepreneurs in agribusiness value chains, signalling that ‘agrarian dualism’ is being bridged although achievements to date are well below government’s targets.

The large-scale commercial system uses the most advanced production technology and occupies approximately 70% of the total land area. These commercial farmers operate large farms, which are situated on prime land, are highly capitalised and integrated into modern agro-food chains (LDA, 2008). The Abstract of the Agricultural Statistics report (Department of Agriculture, Forestry and Fisheries, 2010) reports that there were about 5 053 commercial farmers operating on 5,3 million hectares (mha) of land in 1993. By 2002 the number of independent commercial farm operations had declined to 2 915, whereas the total land under their control amounted to 5,5 mha. This sharp reduction in the numbers of commercial farm operations with marginal increases in land size implies a higher concentration of farmland ownership.

By contrast, small-scale farmers are concentrated in the former homelands areas, which cover approximately 30% of the provincial land surface. Low levels of input use, poor production technology and small farm sizes (approximately 1,5 ha per farmer) are the

main characteristics of this system, with production mainly for subsistence and, in most cases, little or no marketable surplus (LDA, 2008). It has been estimated that there are approximately 303 000 small-scale farmers in Limpopo (LDA, 2008). Smallholders grow mostly cereals and pulses, while the commercial sector concentrates on intensive cash crops or extensive livestock (LDA, 2008). Table 4 reports land utilisation in South Africa and Limpopo.



Table 2. 4: Comparison of land utilisation in Limpopo and South Africa.

Province	Total area	Farmland	% total area	Potentially arable land (ha)	% total area	Grazing land (ha)	% total area	Nat Conserv & Forest	% total area	Other	% total area
Limpopo	11 960 600	10 548 290	88.2	1 700 442	14.2	8 847 848	74.0	1 161 600	10.2	65 410	1.5
South Africa	122 320 100	100 665 792	82.3	16 737 672	13.7	83 928 120	68.6	13 219 963	10.8	8 434 345	6.9
Developing agriculture in the former homeland											
Limpopo	3 612 400	3 394 518	94.0	530 700	14.7	2 863 818	79.3	127 200	3.7	6 060	2.3
South Africa	17 112 800	144 479 766	84.6	2 545 673	14.9	11 934 193	69.7	1 036 468	6.1	1 596 566	9.3
Commercial agriculture											
Limpopo	8 348 200	7 153 772	85.7	1 169 742	14.0	5 984 030	71.7	1 034 400	13.1	59 350	
South Africa	105 207 300	86 186 026	81.9	14 192 099	13.5	71 993 927	68.4	12 183 495	11.6	6 837 779	6.5

Source: Department of Agriculture, Forestry and Fisheries (2010)

Table 2.5 shows the total number of households in Limpopo and South Africa that reported access to farming plots (by average size) between 2005 and 2008, based on the General Household Survey. On average, households in Limpopo have access to plots of about 1.9 ha, relative to the national average of roughly 1.8 ha. In Limpopo province, the total number of households that reported access to farming plots declined from 276 321 in 2005, when 23% of South African households reported access to farming plots, to 148 657 in 2008 (about 12% of national estimates), in contrast to national estimates, which increased from 1 183 441 in 2005 to 1 242 152 in 2008. The reason behind this apparent decline in the number of households that reported access to farming plots requires further investigation. This might signal problems with regard to the data collection methodology used by Statistics South Africa.

Table 2.5: Households reporting access to farming plots by average plot size (in hectares) for Limpopo and South Africa, 2005-2008

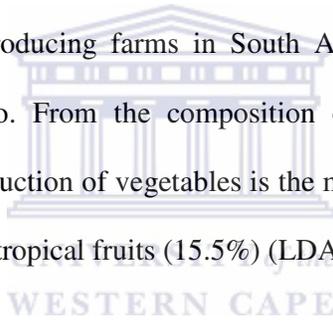
	2005		2006		2007		2008	
	Limpopo	S.A.	Limpopo	S.A.	Limpopo	S.A.	Limpopo	S.A.
Average land size (ha)	1.8	1.86	1.5	1.65	1.8	1.92	2.3	1.8
Std deviation	2.63	3.66	3.01	3.57	3.39	4.24	4.1	3.95
N	276 321	1 183 441	260 510	1 380 252	217 586	1 142 653	148 657	1 242 152

Source: Statistics South Africa (various years), General Household Survey

Limpopo is very suitable for crop production, with two parts of the province experiencing rainfall in excess of 1 000 mm per annum. The first area is the region east of the Drakensberg escarpment, in the vicinity of Tzaneen, and the second is the Zoutpansberg mountain range, from Makhado to Thohoyandou (LDA, 2008). Climatic conditions allow for the cultivation and harvesting of a wide variety of agricultural produce, ranging from tropical fruits such as

banana and mangoes, to cereals such as maize and wheat, and vegetables such as tomatoes, onion and potatoes. Limpopo produces 75% of South Africa's mangoes, 65% of its pawpaws, 25% of its citrus, 25% of its bananas, 25% of its litchis, 75% of its tomatoes, 54% of its macadamia nuts and about 60% of its avocados (LDA, 2008).

Vegetable production is also one of the main farming enterprises in Limpopo. Within the province, the production of vegetables contributes an average of about 22% to the gross income from agriculture, and more or less 18% to the total gross income of vegetables in South Africa (LDA, 2008). According to Statistics South Africa (2002) there were an estimated 349 000 vegetable producing farms in South Africa in 1992. Of these, 87 000 (24%) were found in Limpopo. From the composition of horticultural products in the province, it is clear that the production of vegetables is the most important (49.1%), followed by citrus fruits (25.9 %) and subtropical fruits (15.5%) (LDA, 2008).



Livestock farming is not a dominant industry in Limpopo, with only about 1 173 000 cattle (2000 figures). The province is not a significant producer of milk, but it is suited to the production of goats (contributing about 16.4% to national production.) (StatsSA, 2002). The main animal products in the province are beef and broilers (LDA 2008).

Makhura and Mokoena (2003) studied a range of constraints or barriers faced by small-scale farmers towards successful participation in commodity markets in Limpopo. The lack of transport, poor or no storage facilities, poor road infrastructure, and a lack of market information, institutional responsibility and bargaining power are highlighted as being the

most important constraints. But, most importantly, transaction costs have been highlighted as adversely affecting market participation by farmers in Limpopo (Makhura & Mokoena, 2003)

The LDA (2008) views access to agricultural output markets for all farmers in the province as a strategic intervention area. More precisely, it highlights the need for the provincial government to create a favourable environment for investment in infrastructural and marketing support services, including market information, packaging, storage, transport services and advice for the formation and development of cooperatives (LDA, 2008).

Makhura and Mokena (2003) documented informal arrangements in the maize markets, where farmers agree with the milling company to deliver a bag of maize in exchange for maize meal. However, there are also more structured arrangements that involve downstream linkages of small-scale farmers with buyers in the markets. For, example, Louw, Jordaan, Ndanga & Kirsten (2008) report case study evidence of the Thohoyandou Spar, one of the largest supermarkets in Limpopo, as an example of a success story of the linkages between small-scale farmers and market buyers. However, to qualify as a supplier to large, high-value supermarkets, smallholders need to comply with a host of standards, such as organic farming certificates, food quality and safety regulations and packaging criteria. As a consequence, smallholders may not be able to take advantage of opportunities in agro-food chains.

Policy support for agricultural development in Limpopo

Since the dawn of democracy in 1994, the government has formulated and implemented various policies aimed at restructuring the agricultural sector. Alongside agricultural policy reforms, the redistribution of land featured prominently in this new policy context, as it is grounded in new Constitution. Some of the key programmes adopted include Land Redistribution for Agricultural Development (LRAD), the Comprehensive Agricultural Support Programme (CASP) and Agricultural Broad-based Black Economic Empowerment (AgriBBBEE). The overall stated objective of this altered policy context was to establish an environment for sustainable employment and the targeting of higher income generation for resource-poor farmers (LDA, 2008).

Despite all the agricultural policy reforms implemented in Limpopo, the agrarian structure remains highly dualistic. Access to land and other resources is a major constraint to the expansion and deepening of the participation of smaller farmers (Rwelamira, 2008). While there has been significant progress in the land reform programme in Limpopo², inequalities around water rights, especially in irrigation schemes, appear to be intact (Tapela, 2008). Sebopetji and Belete (2009) identified property rights and high transaction costs as key barriers to rural market development in Limpopo (credit, land and agricultural output markets). The lack of rural infrastructure restricts agricultural development in Limpopo. Although significant progress has been made in terms of public investment programmes (in roads and other infrastructure) aimed at the poor, the successes have been limited and have been biased towards urban areas (Ngqangweni & Delgado, 2002).

² Greenberg (2010) also documented incidents of land transfers and beneficiaries in Limpopo between 1994 and 2009. During this period, 604 259 ha of land was distributed to about 227 630 beneficiaries.

The 2008/09 budget speech by the Limpopo MEC for agriculture made reference to the Comprehensive Agricultural Support Programme (CASP) as an important tool to promote public investment in farm infrastructure. It effectively facilitates the productive use of redistributed land by placing more land under food production and dealing with food (in)security. The Agriculture and Rural Development Corporation (ARDC) has also been mandated to implement the AgriBEE Charter, agribusiness development planning, agricultural finance and food security project planning, and to foster agriculture-led local economic development programmes (Limpopo MEC for Agriculture, 2009).

Figure 4 shows that National government expenditure on agriculture increased from 2001 to 2008. In the 2001/02 fiscal year, the government spent about R872 million. This increased to R3,3 billion in the 2007/08 fiscal year, a nearly four-fold increase in spending over an interval of seven years. Figure 4 shows a comparison between national government's and the Limpopo province's budgets for agriculture. The Limpopo province's budget for agriculture increased between 2001 and 2008; however, the rate at which the budget increased is low in comparison to the increase in the national budget. Closer analysis reveals that provincial governments that host the former homelands (KwaZulu-Natal, Eastern Cape, Northwest, Mpumalanga and Limpopo) spend more fiscal resources on agriculture.

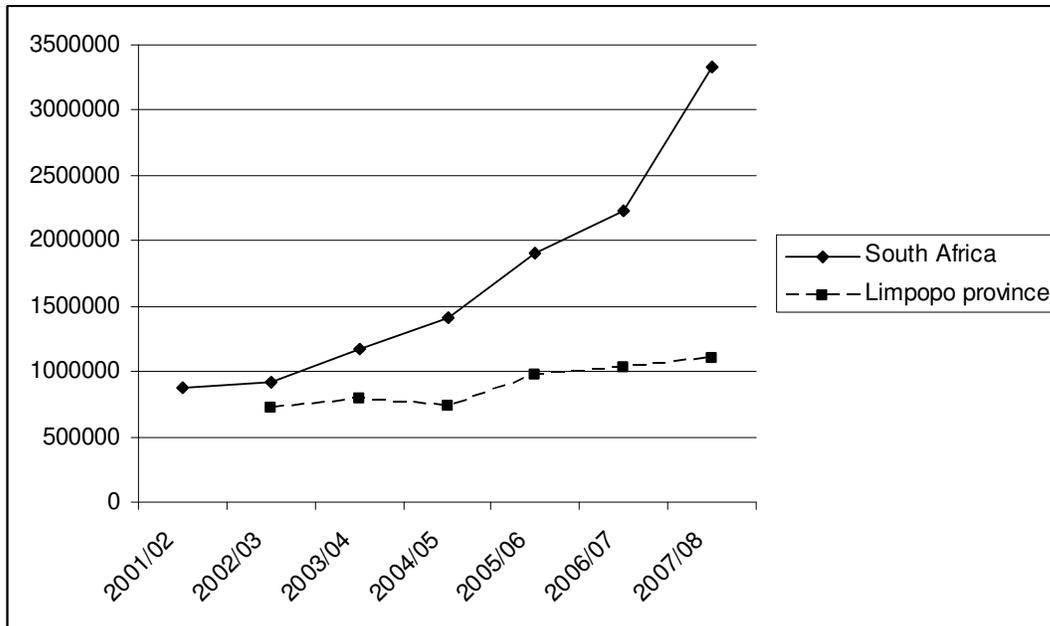


Figure 4: Limpopo provincial and national government expenditure on agriculture, 2001-2008

Source: National Treasury (various years)

Support for the development of small-scale farmers is given through the farmer support programmes. Figure 5 shows that there has been a sharp increase in national government spending on farmer support from 2004/05 onwards. A key explanation for this relates to the introduction of CASP in 2004. Limpopo provincial expenditure on farmer support has been declining since 2004, despite the introduction of CASP; this trend has not changed in recent years. Comparing Limpopo expenditure to national expenditure shows that Limpopo is continuing to lag behind and this might signal problems related to administrative issues or purely government priorities.

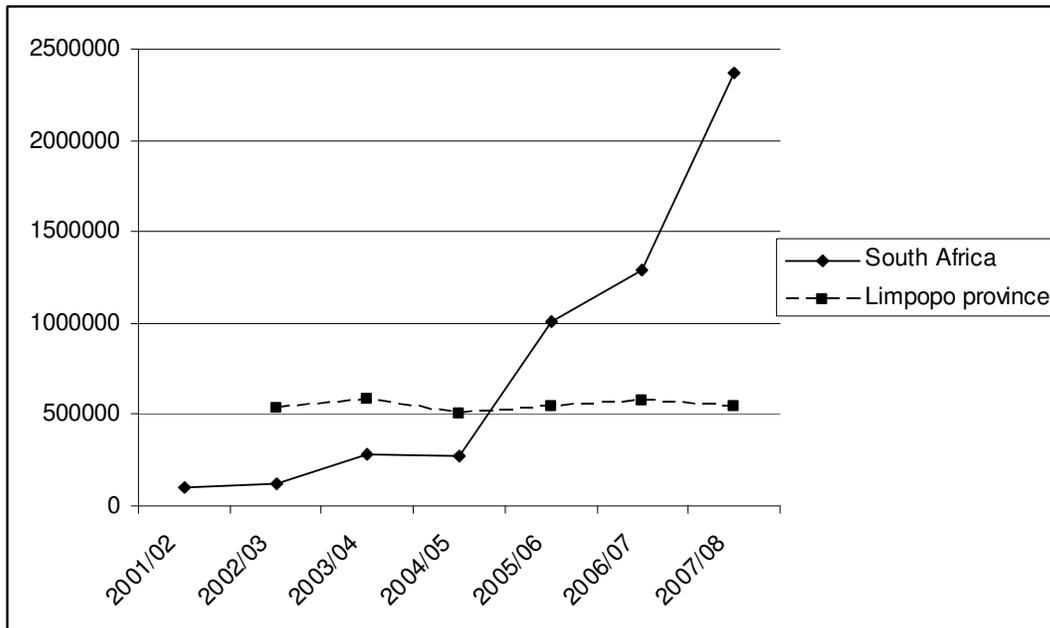


Figure 5: Provincial and national expenditure on farmer support and development, 2001–2008

Source: National Treasury (various years)

Expenditure on ‘farmer support’ is now expressed as a percentage of total provincial expenditure on agriculture. It gives some insight into the extent to which provinces prioritise this commitment to expenditure on support for agricultural development. Figure 6 shows that Limpopo’s spending on farmer support, settlement and development, relative to the overall provincial agricultural spending basket, shows a declining trend between 2002 and 2008 (the National Department of Agriculture’s spending on support and development increased in the same period). However, this is in contrast with the provincial overall expenditure on agriculture in the same period, which has shown an increasing trend. This sheds some light on the shifting priorities over time, and also on where provinces might actually diverge from the emphasis at national level. A related concern is that the adoption of CASP appears to have exerted no visible surge in provincial government expenditure on farmer support. This is in sharp contrast to what was observed in national fiscal allocations after 2004, following the adoption of the CASP.

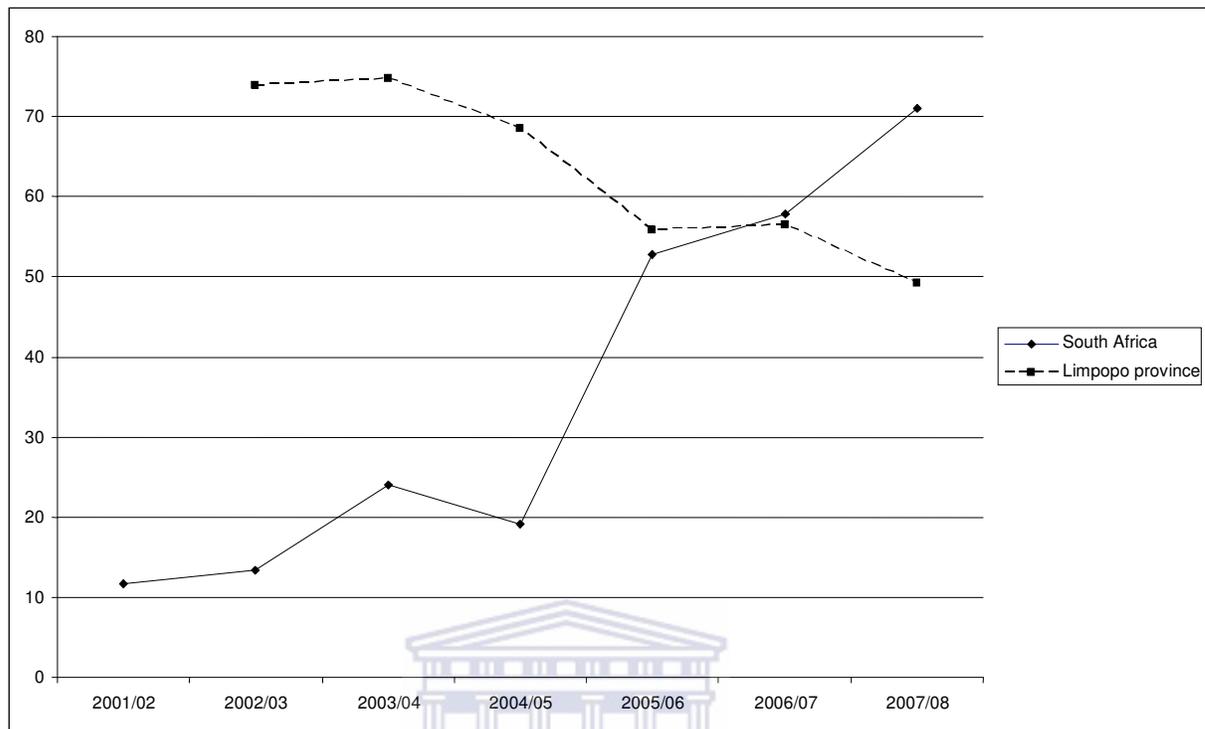
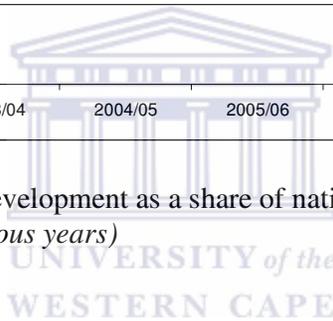


Figure 6: Farmer support and development as a share of national and provincial budgets
Source: National Treasury (various years)



South Africa, similar to other developing countries, established parastatal institutions to channel credit to small-scale farmers (Machethe, 2004). The Land Bank of South Africa, together with the Agricultural Credit Board, was formed to deal with agricultural credit for both commercial and small-scale farmers. The collapse of the Agricultural Credit Board left small-scale farmers without access to credit services. This left the Land Bank as the only wholesale lender to both commercial farming activities and small-scale farmers. The Land Bank's mandate was broadened to accommodate those previously excluded from its services (Sebopetji & Belete, 2009).

Between 2001 and 2009, the Land Bank disbursed a total of R894.4 billion in the form of development loans to small-scale farmers (both long-term and short-term loans). On average,

less than 20% of the Land Banks development loans between 2001 and 2009 were issued in Limpopo. In the 2001/02 financial year, about 40% of the development loans were issued in Limpopo to farmers in Limpopo. This declined to only about 5% in the 2003/04 financial year and increased to just above 20% in 2007/08, before declining to less than 1% in the 2008/09 financial year. The Land Bank faced critical financial challenges in the 2005/06 financial year, and these hampered its ability to drive the transformation of the agricultural sector (Parliamentary Monitoring Group, 2006). Shanduka turnaround strategy has since been introduced at the Land Bank to improve the commercial activities of the bank in order to deliver on its development mandate (Land Bank, 2006).

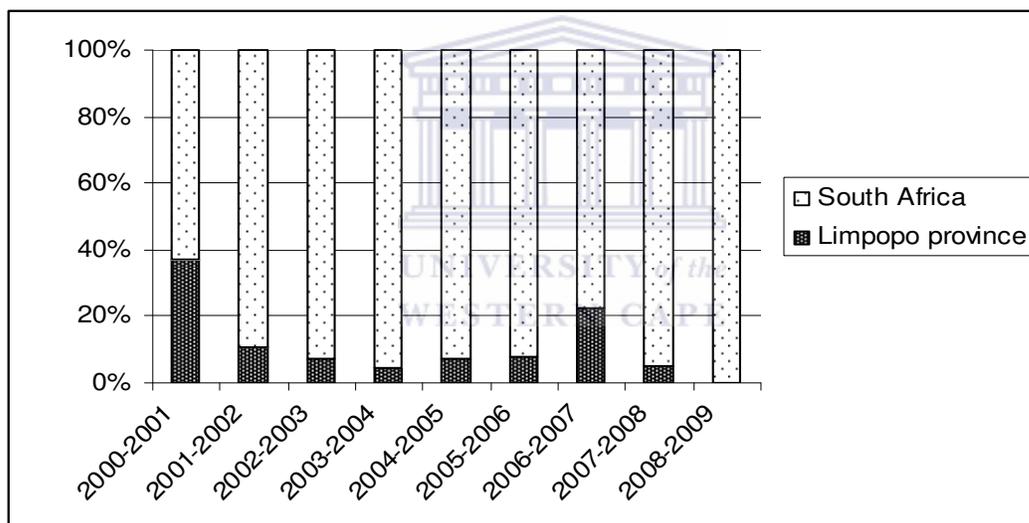


Figure 7: Land Bank development loans in Limpopo province, 2000/01-2008/08
Source: Land Bank (2010)

2.5. Conclusion

This chapter has demonstrated that the economy of Limpopo has been improving in recent years, although it has been below the national average. Poverty rates have been increasing in recent years and the human development index figures show that the livelihoods of the people

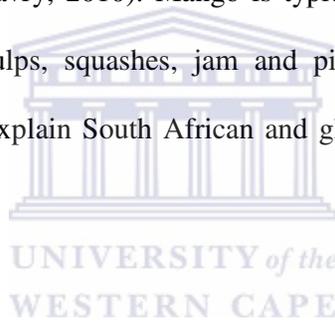
in Limpopo have been improving. The tertiary industry, which includes the financial sector, has been driving the provincial economy. This is a surprising phenomenon; however, since the expectation would be that because Limpopo is still at an early stage of agrarian transition, agriculture should be driving its economy. The agricultural sector has been highlighted as one of the key sectors in the provincial economic growth and development plan (LEGDP), and a puzzling picture is that its contribution to the provincial GDRP has been low and declining. The conventional approaches to land and agriculture in South Africa emphasise the contrast between the white (commercial) and black (small-scale) farming sectors, based on wide differences in land-holding patterns, output and efficiencies (Lahiff, 2000).

The state of agriculture in Limpopo is promising, but the province has not been spending much on agricultural development and support (relative to national levels). The analysis of the provincial agricultural budget shows that provincial expenditure on agricultural support has been declining in recent years. It might be necessary to investigate more carefully the reasons behind this apparent shift in spending priorities. Furthermore, small-scale farmers' participation in the markets is characterised by barriers that raise the transaction costs. Therefore, ensuring small-scale farmers' participation in the markets requires a reduction in transaction costs.

CHAPTER THREE: OVERVIEW OF MANGO INDUSTRY

3.1. Introduction

Mango is a tropical fruit crop that accounts for nearly half of the worldwide production of tropical fruits (Maneeapun & Yunchalad, 2004; FAOSTAT 2010). It is also grown in subtropical areas (NDA, 2008). There are many mango cultivars throughout the world, with more than 500 classified varieties found in Asia and India (FAO, 2009). However, international trade in mangoes is dominated by varieties like Keitt, Kent, Haden and Tommy Atkins (Evans, 2008), mainly because of consumer preferences in the European and Western markets (Sangho, Labaste & Ravry, 2010). Mango is typically consumed as a fruit, but is often processed into juices, pulps, squashes, jam and pickles (Sauco, 2004). The main objective of this chapter is to explain South African and global trends in the production of and trade in mangoes.

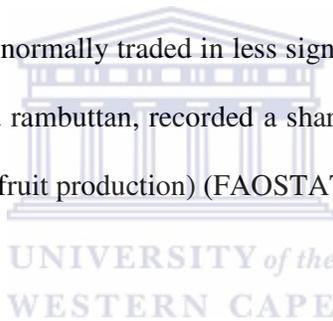


Based on the available data, our global overview of mango production and trade trends seeks to answer the following questions: Who are the leading mango producers? What are the trends in global mango trade, demand and consumption? What is the position of small-scale farmers in the international value chain? Given the emphasis on domestic mango markets, this chapter brings together information on South African mango production and output markets with the aim to answer the following questions: What are available mango output markets? What trends exist in quantities sold and prices over the past decade? Does the South African mango industry export to other countries and to what extent has this changed over time? What is the position of small-scale farmers in the South African mango value chain? The first part of this chapter assembles international evidence of salient trends in the global

mango industry, and the second section brings together South African evidence to locate the position and roles of small-scale farmers in mango markets.

3.2. Global mango production

Mangoes are produced in over 90 countries worldwide (Evans, 2008). Mango is the dominant tropical crop variety produced worldwide, followed by pineapple, papaya and avocado (Cassani *et al.*, 2009). World production of tropical fruits was estimated at over 82.7 million tons in 2008, slightly more than what was produced in the previous year, and mango dominated global output with a share of almost 40%. World production of pineapples comprised about 25%, followed by papaya with 10% and avocado with 4%. The minor tropical fruits, i.e. those that are normally traded in less significant quantities, such as durian, litchis, guavas, passion fruit and rambuttan, recorded a shared output of 17.8 million tons in 2008 (about 22% of all tropical fruit production) (FAOSTAT, 2010).



In 2008, Asia was the chief producer of mangoes, accounting for about 74% of world production. Latin America and the Caribbean contributed combined 16%, while Africa and Oceania contributed a combined share of 10%. Pineapple production in 2008 was also dominated by Asia, with a share of about 49% of world production, followed again by the Caribbean and Latin America with 38% and lastly Africa with about 12%. The Caribbean and Latin American region constituted over two-thirds of global avocado production and 39% of all papaya production (FAOSTAT, 2010).

Table 3.1 presents the world's top five mango producers between 2001 and 2007. India is by far the major producer of mangoes in the world, with 40% of the global production in 2007, followed by China, with only 12% (FAOSTAT, 2010). Other leading producers include Mexico, Indonesia and Thailand, with over 1 million metric tons of production in 2007 (FAOSTAT, 2010). A common feature of all major mango-producing countries is that output is primarily consumed domestically (Cassani *et al.*, 2009).

Table 3.1: The world's leading mango producers, 2001-2007 (million metric tons)

Country	2001	2003	2005	2007
India	10	12.7	11.8	13.5
China	3	3.6	4.2	3.7
Mexico	1.7	1.7	1.8	1.9
Indonesia	1.6	1.5	1.7	1.8
Thailand	990	136	167	180

Source: FAO STAT (2010)

Global mango output was forecasted to reach 30.7 million tons by 2010 (Sangho *et al.*, 2010). The most significant increase in mango production in Asia and the Pacific region is forecast for China, with nearly 8% forecast compound growth and projected output forecast to increase from 3 million tons in 2001 to nearly 6.3 million tons by 2010. Production in Mexico, the principal mango-producing country in Latin America and the Caribbean, is forecasted to increase to 1.9 million tons. Overall, production is likely to reach 23.7 million tons in the Pacific and Asia, 4.1 million in the Caribbean and Latin America, and 2.8 million in Africa. Asia and the Pacific are expected to continue dominating world production of mango (FAO, 2009).

Mango cultivars vary on the basis of the colour, shape and size of the fruit (Cassani *et al.*, 2009). Table 3.2 presents some of the common commercial mango varieties that are produced worldwide and their origins. In India, for example, Alphonso is the most common variety produced. However, this cultivar is not the most favourable among the small-scale farmers because of its prolonged harvest and processing season (Cassani *et al.*, 2009). Other local varieties, such as Totapuri, are favoured by small-scale farmers, with over 80% of farmers having recorded production of this variety in 2009 (Cassani *et al.*, 2009). In Mexico, Manila is the most common cultivar and it is mainly targeted for domestic markets, since its shelf life is too short and it does not stand up to the hot water treatment (HWT) required in countries such as Japan (Hanemann, Bourns & Fertiger, 2008). In Australia, the leading mango variety grown domestically is the Kensington Pride, accounting for almost 70% of total plantings in 2006 (Timbercorp, 2006). The Kensington Pride is popular among consumers for its taste, but is criticised for its inconsistent yields, variable quality and poor shelf life (Timbercorp, 2006). Major cultivars in the United States of America (USA) are Keitt and Tommy Atkins, which account for 70% and 20% of the hectares respectively (Evans, 2008).

Table 3.2: Major commercial mango cultivars grown throughout the world.

Cultivar	Country of origin	Fruit characteristics
Carabao	Philippines	Fruit medium (10 oz.), elongated, kidney-shaped, light green blushed yellow, fibreless. Seed very large, flesh stringy, acid and juicy.
Edward	Miami, FL. USA	Hybrid of Haden X Carabao. Intermediate between Indian and Philippine forms. Fruit medium to large, elongated ovate, apex often oblique, yellow green with red blush. Flavour excellent.
Haden	Miami, Fl. USA	Fruit large (to 24 oz.), regular ovate, yellow almost covered with red, flavour mild, little fibre.
Irwin	Miami, Fl. USA	Fruit medium, 12-16 oz., elongated, ovate regular in form, orange yellow with deep blush, flesh bland, fibreless.
Keitt	Homestead, Fl. USA	Fruit large (20-26 oz.), ovate with slightly oblique apex, green, flesh rich, fibre only around seed.
Kent	Coconut Grove, Fl. USA	Fruit large (20-26 oz.), regular ovate, greenish yellow with red shoulder, flesh rich, fibreless.
Manila	Veracruz, Mexico	A seedling strain from Hawaii. Philippine type. Fruit small to 10 oz., shaped long, flat, yellow, flavour sharp.
Tommy Atkins	Fort Lauderdale, Fl. USA	Fruit medium to large, 16 oz. with thick skin, regular ovate, orange-yellow covered with red and heavy purple bloom. Firm, juicy, medium fibre, fair to good quality.
Alphonso	India	The fruit quality is excellent and keeping quality is good. It has been found good for canning purposes.

Source: FAO (2009)

Given the concentration of mango in tropical and sub-tropical agro-ecological zones, there appears to be little variation in planting and harvesting seasons across different cultivars. For example, India's major mango season is April to July, but production in Brazil, Columbia, Kenya and Venezuela is all year round. The season is also quite long in Burkina Faso, Costa Rica, Indonesia, Mexico, Nicaragua and Puerto Rico, Brazil, Venezuela, Costa Rica, Israel, Mexico, Haiti, South Africa and the USA, and these countries have emerged as competitors of India in the global market. For example, in Mexico the mango season starts in March and lasts until September, and in Haiti the season is from January to September (FAO, 2009). However, these countries do not enjoy the comparative advantage of Indian varieties like Alphonso (Hallam, 2004).

3.3. Global markets and trade in mangoes

According to Hanemann *et al.* (2008), the majority of the world's mangoes are consumed in the country where they are grown. Only a small part of the mango crop is intended for international trade (Stefan, Hau & Von Oppen, 2003). For example, in India about 96% of mangoes are consumed locally in its domestic market. In 2006 alone, out of 10 million metric tons produced, only 40 000 metric tons were exported (Maneepun & Yunchaland, 2004). This is against the backdrop that India has increased its participation in world export markets (Hanemann *et al.*, 2008). Evans (2008) estimates that about 3% of the world production of mango is traded globally.

In terms of supply, Brazil, Peru, Mexico, Haiti and Ecuador deliver the bulk of mango exports to the North American market. Pakistan and India are dominant suppliers of the West Asian market. The Philippines and Thailand mostly supply the Southeast Asian markets. Most South American nations supply mangoes to European markets (Evans, 2008).

3.3.1. Mango export markets

Between 1966 and 2005 there was a remarkable growth in mango exports. Factors that explain this growth are attributed to improvements in post-harvest techniques (Hanemann *et al.*, 2008). Investments in cold storage facilities, post-harvest handling methods and the packaging of mangoes have improved their shelf life. For example, in countries such as Pakistan, investments in post-harvest technology for mango amounted to \$1 billion or even more between 1990 and 1993 (Maneepun & Yunchaland, 2004). In 1966, world mango exports were 7 200 metric tons and this increased to 912 000 metric tons in 2005, an annualised growth rate of 13% in 40 years (Hanemann *et al.*, 2008). Export revenues in the

same period rose from just over US\$1 million in 1966 to US\$543 million in 2005, a compound annual growth of 17%.

There has been a decline in the average rate of price increases for most mango varieties in recent years as the fruit became more available worldwide (Evans, 2008). For example, between 1966 and 1984, prices increased by 8% whereas between 1985 and 1996 prices increased by 5%. Prices started falling between 1997 and 2004. In 1997, the price per kilogram of mango fluctuated in the region of \$0.86 to \$0.91 (USD/kg), but by 2004 this range declined radically to the \$0.60 to \$0.65/kg. The decrease in mango prices affected all chief western markets, with Germany experiencing a decline of -0.1%, France encountering a -0.3% decrease, and the United Kingdom experiencing -4.3% (FAOSTAT, 2010; Hanemann *et al.*, 2008).



The world's leading mango exporters are Mexico, Brazil, Peru, India, Pakistan and the Philippines, and together they represented about 75% of the total world export market in 2008 (Sangho *et al.*, 2010). Mexico and other Latin American countries, mainly Colombia, Brazil, Guatemala, Ecuador, Haiti, Peru and Venezuela, export the majority of their mangoes to North America, especially to the USA, but also to the European Union. In fact, Mexico is the major supplier to the United States of America, while Brazil is the major supplier to European markets (FAO, 2009). In 1997, more than 91% (i.e. more than 186 000 tons) of all Mexican mango export was shipped to the USA (Crane, Meredith & Saad, 1997). However, in 2008 Mexican mango exports to the USA declined to about 85%, with varieties such as Ataulfo and Tommy Atkins dominating exports. The major reason behind this decline is attributed to regulation in the United States because of the fear that Mexican mangoes were

contaminated with fruit fly (USDA, 2010). The US government also prohibited imports of the Mexican Manila variety because it did not comply with US standards (USDA, 2010)

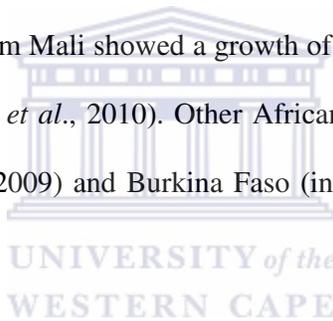
Mexico, with its proximity to the US market and inexpensive transportation costs, has a comparative advantage over other western hemisphere competitors and tends to dominate the market from May to August (Evans, 2008). An additional advantage is that the regulatory regime in the US no longer requires that mango exports from Mexico use hot water treatment (HWT) to gain entrance into the United States market. This has been identified as a problem for most mango producers in the US, who are more likely to be pushed off the market (Haneman *et al.*, 2008).

In the Middle East, Israel mostly produces for the European Union and regional markets, with varieties such as Tommy Atkins and other traditional varieties dominating the exports. Between 2004 and 2009, mango exports from Israel to the European markets showed remarkable growth of 24% (from 2 096 metric tons in 2004 to 3 480 metric tons in 2009). In the same period, Pakistan recorded an increase of only 4% (from 10 938 metric tons to 12 913 metric tons in 2009) in exports to the European markets (Sangho *et al.*, 2010).

In Asia, the major export destinations for Indian mangoes include the Gulf countries (51%), Bangladesh (33%) and the European Union (10%). Indian varieties such as Alphonso, Kesar, Banganapali, Totapuri and Chausa are varieties in greater demand, especially in the European markets (Hallam, 2004). India was responsible for about 30% of mango exports to the European market between 2004 and 2009 (with about 915 metric tons in 2004 and 2 470 tons in 2009). In general, the mango export growth to the European market between 2004 and 2009 was 9% (Sangho *et al.*, 2010).

Other important mango exporters in Asia, such as the Philippines, Australia, Taiwan and Thailand, predominantly ship their varieties to regional Asian markets, especially to Japan, Singapore and Hong Kong. This is mainly due to the fact that consumers in the Far East have been familiar with mango for many years, whereas it is still exotic in the western markets (MarketAg, 2002).

In Africa, leading exporters are Nigeria, South Africa, Cote d'Ivoire, Kenya, Egypt and Mali. Cote d'Ivoire has exported larger volumes of mangoes, mainly to the European markets, than other competitors on the African continent, except for South Africa (Sangho *et al.*, 2010). Mali is also one of the African countries that exports to the European markets. Between 2004 and 2009, the mango exports from Mali showed a growth of about 24% relative to 9% annual growth in total exports (Sangho *et al.*, 2010). Other African countries that exports mangoes include Kenya, Egypt (20% in 2009) and Burkina Faso (in West Africa) (Hanemann *et al.*, 2008).



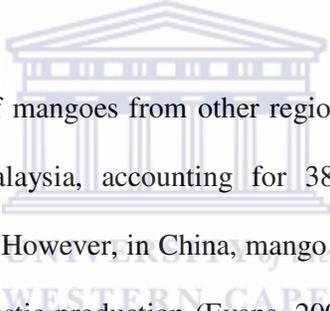
Processed mangoes account for only a very small percentage of exported mangoes (between 1% and 2%) (Sauco, 2004). For example, in 2000 less than 7 000 metric tons of mango pulp was traded. Thailand is the major exporter of mango pulp, accounting for 97% of global trade (Sauco, 2004). Most processing is done by the farmers and their families for their own consumption or for selling it on local retail markets (Evans, 2008).

3.3.2. Mango import markets

The European Union (EU) is the major importer of all sorts of fruits from developing countries (Evans, 2008). Large volumes of Watermelons, grapes, oranges and apples were imported by the EU from 2003 to 2005. Mango exports to the EU showed an increasing trend

between 2003 and 2005 (Hewett, 2006). Banana and cashew nut exports to EU markets were less important.

Mangoes are rather unique in that they are imported in significant volumes by developed countries, as well as by developing countries (Evans, 2008). Major importing regions are North America, with 42% of global fresh mango imports, followed by Europe and the Far East, accounting for 24% and 17% respectively in 2008 (Evans, 2008). The developing world as a whole accounts for roughly one third of global mango imports, with the Near and Far East being responsible for the largest volume of imports of developing countries (Evans, 2008).

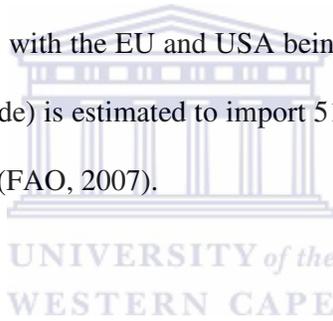


In 2007, significant importers of mangoes from other regions of the world were the United Arab Emirates, China and Malaysia, accounting for 38 000, 32 000 and 25 000 tons respectively (FAOSTAT, 2010). However, in China, mango imports have been declining due to a significant increase in domestic production (Evans, 2008). For example, in 2004 China produced over 3 million metric tons of mango, and this number increased to over 3.7 million metric tons in 2007 (FAOSTAT, 2010). Hong Kong imports a large bulk of mangoes to re-export them to Singapore, the United States of America and Saudi Arabia. In 2007, the Netherlands was the largest importer of fresh mangoes with regard to volume (about 63 000 tons), followed by France (about 30 000 tons), Germany (about 24 000 tons) and the United Kingdom (about 23 000 tons) (FAOSTAT, 2010). The Netherlands accounted for approximately one third of the entire imports into the European Union (FAOSTAT, 2010).

Approximately two-thirds of all Dutch mango imports are re-exported to other European countries. The same applies to France and Belgium, which also re-export a huge proportion

of their fresh mango imports. In overall, 63 000 tons of Europe's total of 180 000 tons of fresh mango imports are derived from intra-European trade (Sangho *et al.*, 2010).

There is a prominent seasonality to the European market, with huge quantities of mango imported during the second (April to June) and fourth (October to December) quarters (FAO, 2009). Although the Netherlands, France and the United Kingdom are expected to be the chief import markets, Spain is also expected to emerge as a more significant import market player (Sangho *et al.*, 2010). Mango imports into the USA are estimated to grow by 7% on average, to attain 450 000 tonnes by 2010 (FAO, 2007). Global mango imports are also expected to reach 1.5 million tons by 2010, and this should persist to illustrate the strongest augmentation in import demand, with the EU and USA being the pinnacle importing nations. The EU (apart from intra-EU trade) is estimated to import 514 000 tonnes of mango by 2010, with estimated growth at 15.7% (FAO, 2007).



3.4. South African mango production and trade

In South Africa, mango is the third most important subtropical crop after citrus and banana (NDA, 2008). The main areas of mango production are situated in the north-eastern part of South Africa (NDA, 2008). These areas are mainly in provinces such as Mpumalanga and Limpopo. Provinces like KwaZulu-Natal, Gauteng, and the Eastern, Western and Northern Cape also produce mango. The total hectares under mango cultivation in 2005 was approximately 7 730, with Hoedspruit and Tzaneen in Limpopo province being the highest contributor, with over 64% of the total land under cultivation (NDA, 2008). Malelane in Mpumalanga contributed roughly 19%, and other provinces such as the Western Cape, Eastern Cape and Gauteng contributed roughly 18%.

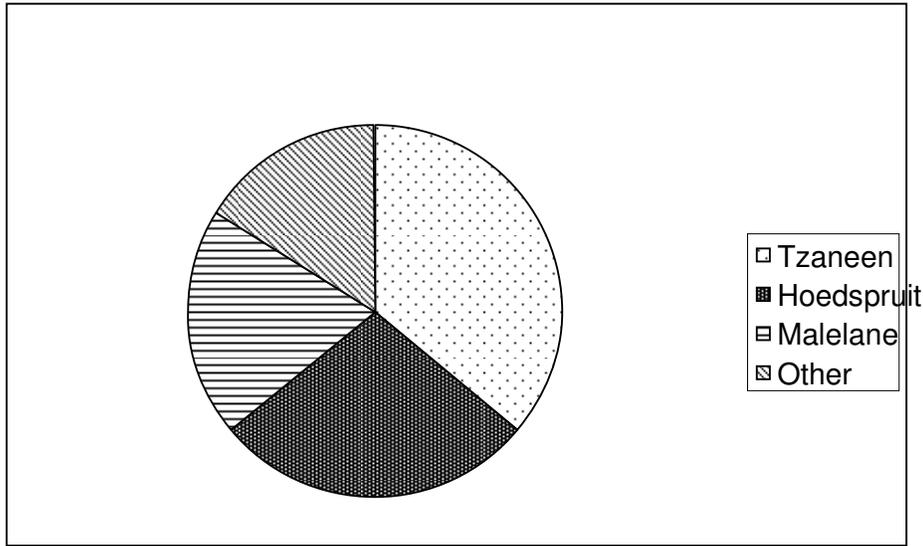


Figure 8: Mango-producing areas in South Africa
Source: SAMGA (2008)

On average, the gross value of production (GVP) has experienced a generally increasing trend between the 1995/96 and 2004/05 seasons. However, in the 2002/3 season the GVP for mango declined due to unfavourable climatic conditions, which included a drought that affected the major producing areas. Figure 3.2 below shows the GVP for mango between the 1995/06 and 2004/05 seasons.

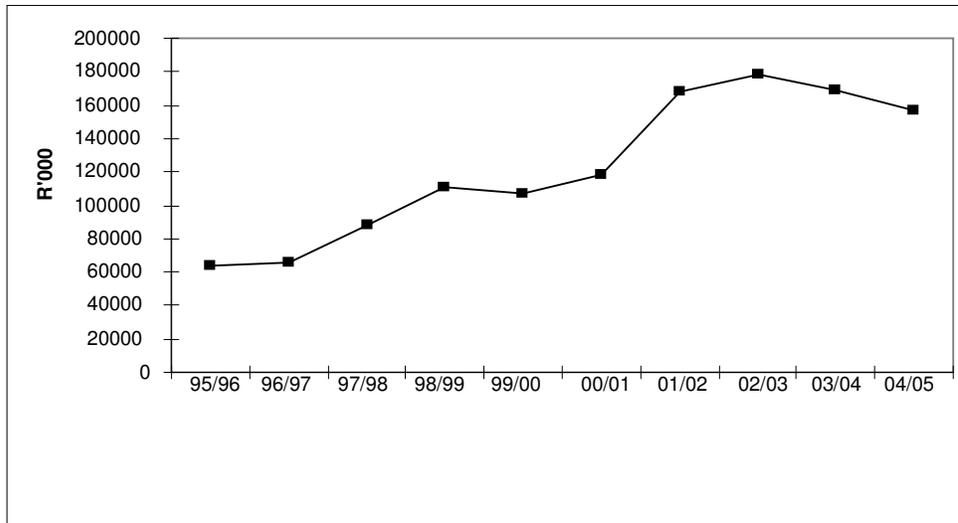


Figure 9: Gross value of mango production, 1995-2005

Source: SAMGA (2008)

In South Africa, the most important cultivars that are grown include Fascell, Haden, Keitt, Kent, Sensation, Tommy Atkins and Zill. There is no available data on the quantities of the different types of cultivars produced; the only available data is aggregated. There has been a generally increasing trend in mango production between 1986 and 2008. In the 1985/1986 season, 29 820 tons of mango were produced, and this has been increasing since then to achieve a peak of about 90 000 tons in 2003/2004, before declining to about 80 000 in the 2007/08 season. Similar to the global mango production statistics, the South African mango production data does not show the production of different mango varieties.

From figure 10, there are three observable trends in South African mango production. Phase 1 was between the 1995/6 and 2001/02 seasons, when there was an estimated 89% growth rate and an average annual growth rate of 13%. This might have been caused by favourable climate conditions. The second phase occurred between the 2002/03 and 2004/05 seasons, when there was a growth rate of approximately 32% and an average annual growth rate of

5%. Comparing this to the initial 13% annual growth rate in the earlier period, there was a decline in mango production, which continued in the third phase. The third phase occurred between the 2005/06 and 2007/08 seasons. During this period, there was a growth rate of about 36% and an average annual growth rate of 5% and, as highlighted, still indicates a declining mango production trend. Other factors that may be responsible for this decline are the decline in total land under cultivation and aging mango trees. However, there might be other reasons for these trends.

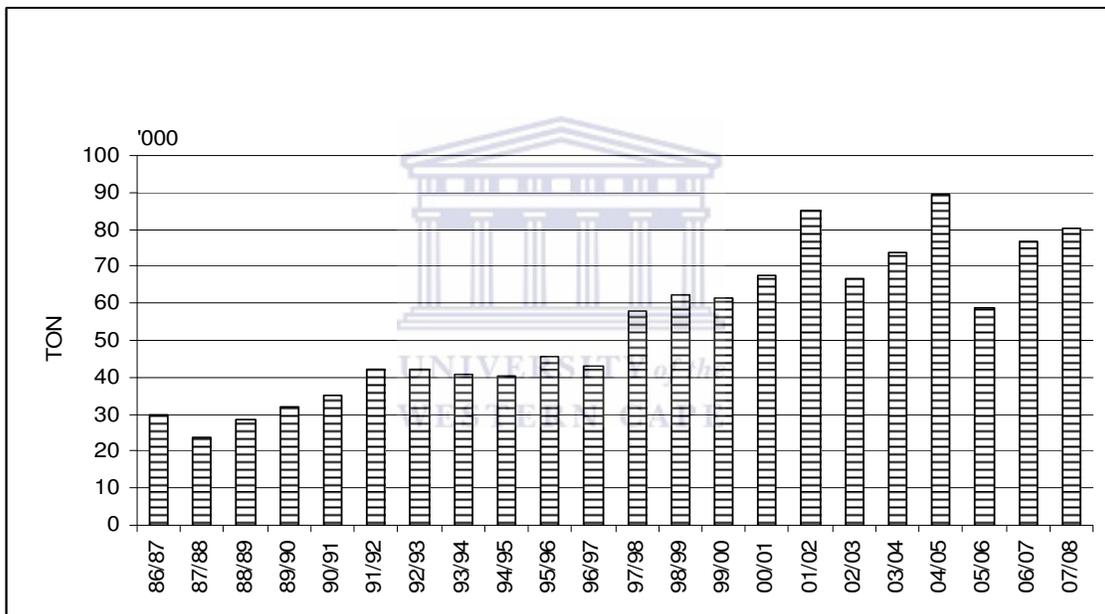


Figure 10: Mango production trend in South Africa, 1986-2008.
Source: SAMGA (2008)

3.5. South African mango value chain

The mango value chain consists of different channels through which mango is eventually sold to the final consumer. According to SAMGA (2008), the most common markets for mangoes includes fresh produce markets, informal markets and processing factories (for atchar, juice and dried fruit, or directly to wholesalers), and a smaller portion is then exported. Between

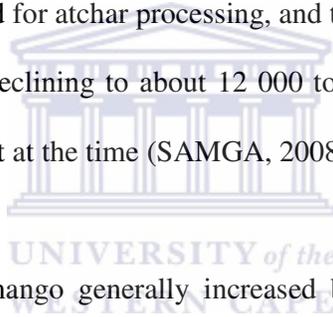
20% and 30% of mango produced is sold as fresh fruit, 15% to 20% is exported to the European Union, while 10% is processed into juice and dried mango. Lastly, less than 10% is processed into dried fruit (NDA, 2008; SAMGA, 2008).

The rising competition in the South African fruit industry and the need to meet norms and standards related to product characteristics, the production process and its impact on food safety and on the environment, has meant a changing relationship between farmers and buyers (Grote & Dorr, 2009). The alternative strategies of buyers such as the supermarkets include establishing formal and informal agreements with farmers, and the establishment of distribution centres, which allows for greater leverage and forcing their quality and safety norms (Ponte & Gibbon, 2005).

The mango market, for example, is very heterogeneous, with different producers and buyers. The presence of diverse economic actors along the value chain is also different among regions at the several stages of the mango value chain (Kevin, Marsden & Murdoch, 2006). Due to high its perishability, mango requires careful control of the growing, packaging, transportation, ripening and distribution processes. This leads to a highly vertically integrated mango sector, where large multinational companies tend to control the entire process, from direct growing of mangoes through ownership of specialised refrigerated shipping and ripening facilities to distribution networks. Analysis of the South African mango value chain reveals that farmers face the challenges of the increasing role that is played by agro-processing industries and retail chains in the distribution of mangoes (Gebre-Madhin, 2001). The concern is that small producers' participation in the national and international fruit (and vegetable) value chain is diminishing as a result of the increasing prevalence of food quality standards in the sector (Ponte & Gibbon, 2005).

3.5.1. Mango processing

In general, agro-processing is the single largest market for mango in South Africa. Approximately 73% of all mango produced in 2008 was sold to the agro-processing industries (Department of Agriculture, Forestry and Fisheries, 2010). Agro-processing is the process of turning primary agricultural products into other commodities for the market (Cassani *et al.*, 2009). In South Africa, mango is processed into different products, namely, atchar, juice, and canned and dried mango. Atchar is a green pickle that is produced from mango, harvested before the seed is lignified (NDA, 2008). The atchar market is one of the larger markets for mango producers in South Africa. Figure 3.4 shows that, in 1982/83, about 16 000 tons of mangoes was sold for atchar processing, and this increased to over 20 000 tons in the 2001/02 season, before declining to about 12 000 tons in 2002/03. This decline was primarily due to a severe drought at the time (SAMGA, 2008).



The price per ton for atchar mango generally increased between from the 1986/1987 to 1993/1994 season. In the 1986/1987 season, the price per ton of mango was only R200, and it increased to R600 in the 1993/1994 season, thus tripling in price. However, the price remained fairly stable between from the 1994/1995 to 2001/2002 season, at R600/ton. The price per ton in 2003/2004 declined, but it increased in the 2004/2005 season and then remained stable in the 2006/2007 and 2007/2008 seasons at R800/ton. The prices in the atchar market are relatively lower, compared to the juice, fresh and other markets.

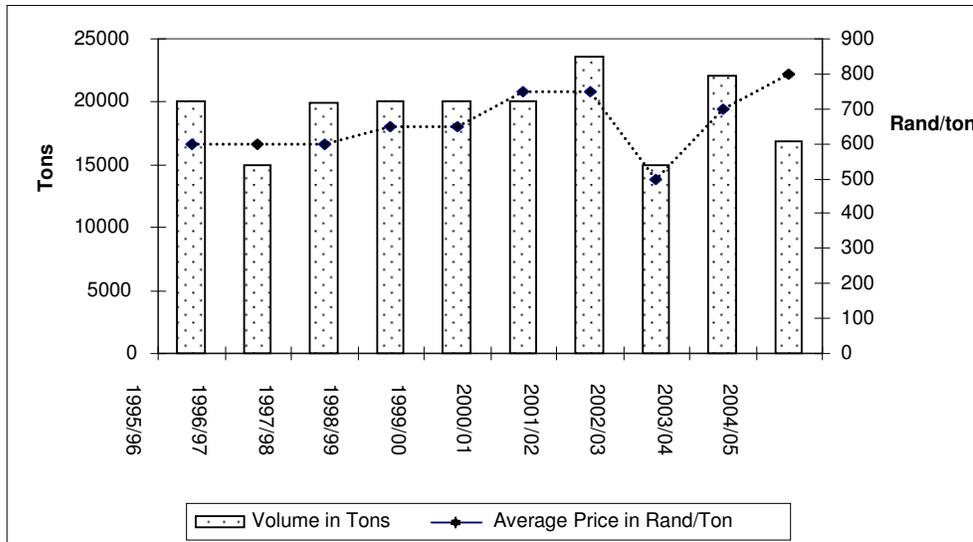


Figure 11: Market for atchar, 1995-2005
Source: SAMGA (2008)

The second major market for mango is the juice market. The volume of mangoes sold in the juice market has experienced a generally increasing trend since the 1986/1987 season. However, there has been an increase in the volume sold to the juice market since 2003/2004. This may have been influenced by an increased demand (NDA, 2008). Although there has been a generally increasing supply of mango for the juice market, the prices have remained fairly stable in most seasons. From the 1987/1988 to 1991/1992 season, the prices per ton increased from R350 to R750. The prices have since been stable, at R800 from the 1992/93 to the 1994/95 season, and then increased to R900 between the 1995/96 and 2001/2002 seasons and lastly increased to R1 200 from the 2002/2003 to 2005/2006 season. Prices in the juice market are relatively higher compared to atchar, primarily because the atchar market is early season while the juice market is mid/late season. As such, producers get higher returns since the risk involved in ripe fruit is also high, e.g. theft, pests, flies, etc.

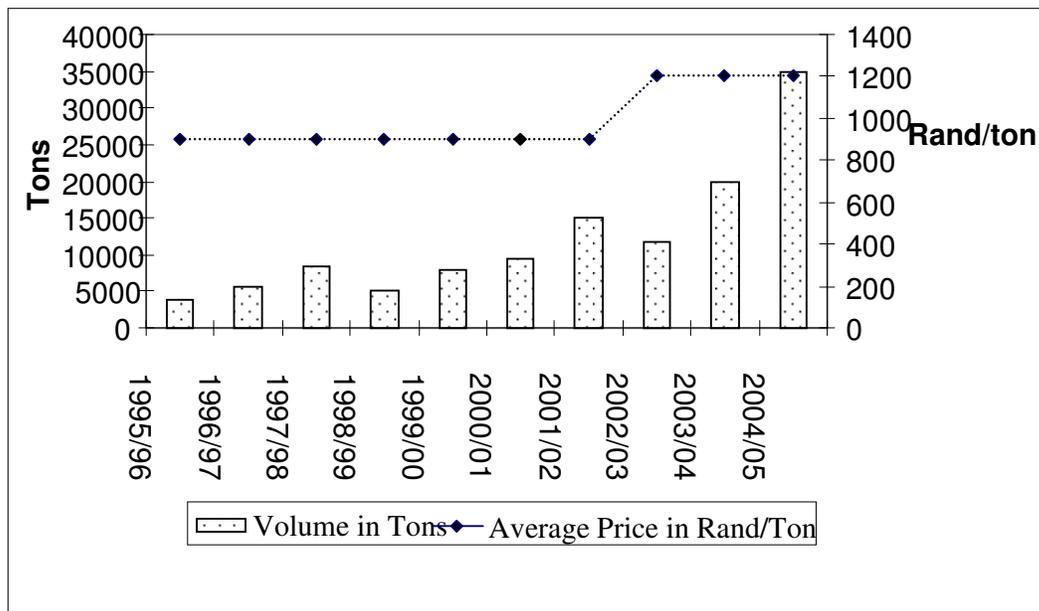


Figure 12: Mangoes supplied for juice processing (volume and average price), 1995-2005
Source: SAMGA (2008)

Mango can also be processed into dried fruit and be preserved for long-term consumption. The dried mango market is not very popular with farmers. The volume of mangoes sold in this market has been increasing since the 1986/87 season and the trend is generally also generally increasing. In the 1986/87 season, only 250 tons were sold in these markets, and this increased to 2 500 tons in the 1996/97 season and increased dramatically to 14 560 tons in the 2007/08 season. The dried mango and juice markets are competitors because they both facilitate the exchange of ripe mangoes, unlike the atchar market, where only unripe early-season mango is sold.

The prices of dried mango are relatively higher than both the atchar market and the juice market, as was evident from the 1996/97 to the 2005/06 season. One explanation for this trend is that, since farmers mostly sell their mangoes in the juice and atchar markets, there are small quantities left to be sold to the dried mango market and thus the supply is low, which

pushes prices up. However, there may be other reasons attached to this phenomenon, e.g. the demand for dried mango, etc. The dried mango market has been identified by the National Department of Agriculture as one area that shows growth potential; however, given a rising supply of mango to the juice market, this is unlikely to be the case in the future, although prices are lucrative in the dried mango market.

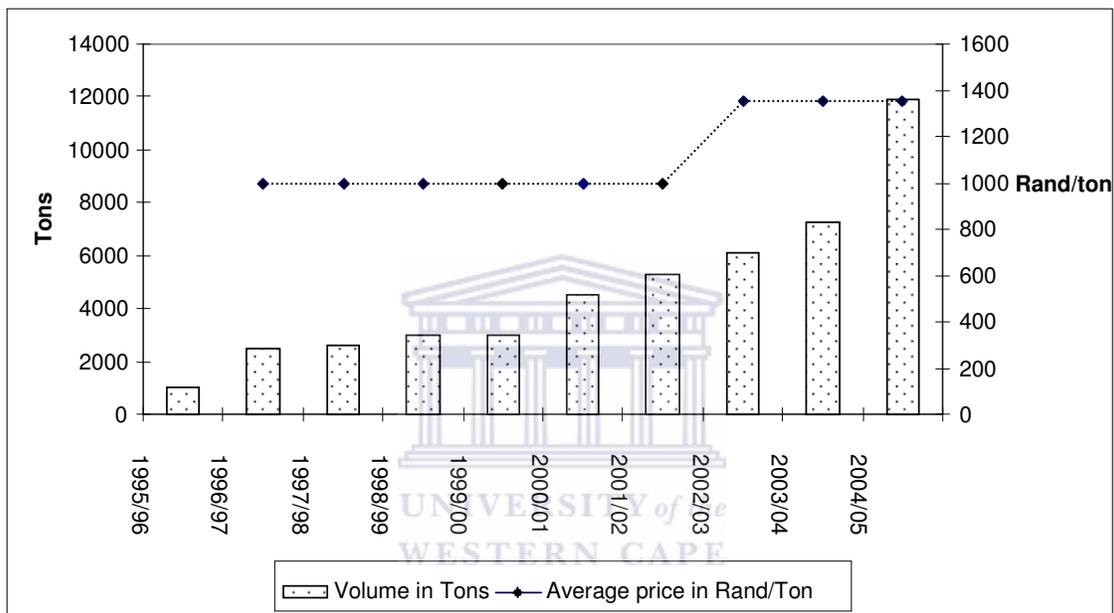


Figure 13: Dried mango volumes and average price, 1995-2005
Source: SAMGA (2008)

The share of mango sold to the dried market has also been increasing, but it has remained very small. This means that farmers do not sell most of their mangoes in these markets, although the prices are good relative to the two other markets, namely atchar and juice. There is competition between the atchar, juice and dried mango markets, which might be the reason why small quantities are sold in the dried market. Another reason might be that consumer preferences lie mostly with the atchar and juice markets. This factor leads to decreased demand for dried mango, which is reflected in the dried mango market.

3.5.2. Fresh mango markets

Mangoes are also sold to retailers, informal traders/hawkers and national fresh produce markets. Smaller quantities are sold to hawkers or informal traders, who buy mangoes directly from the pack houses (SAMGA, 2006). There was a generally increasing trend in the number of mangoes sold at the municipal markets, until the 2002/03 season, when the trend started declining. The prices in the national markets remained fairly stable between the 1995/96 and 2001/02 seasons, but started to show an increasing trend after that period. The upward trend in prices between the 2003/04 and 2004/05 seasons could be accounted for by the increased demand and decreased supply.



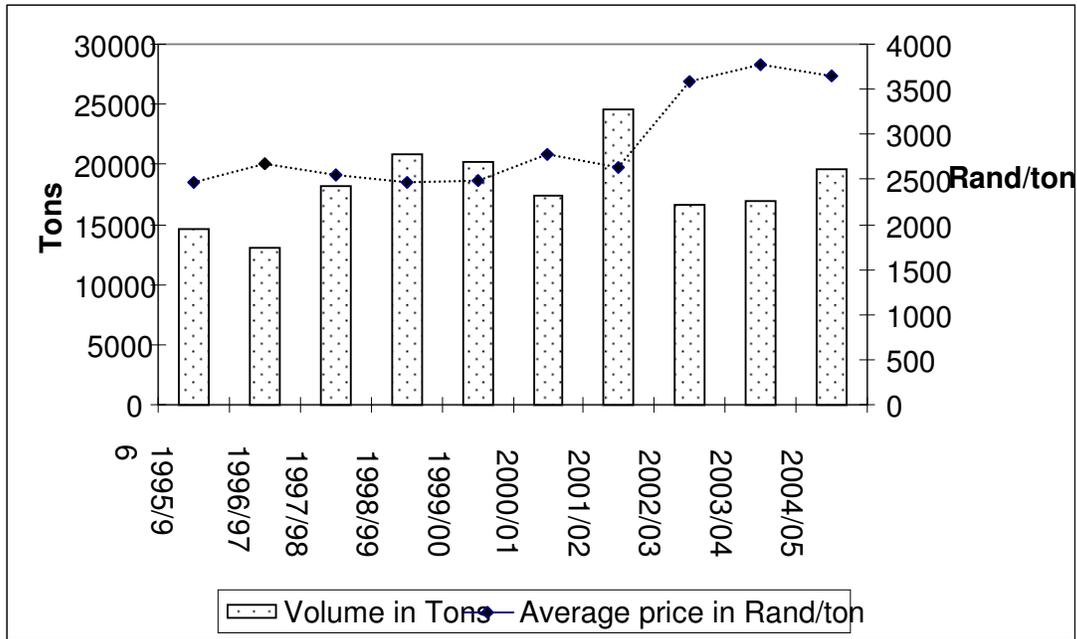
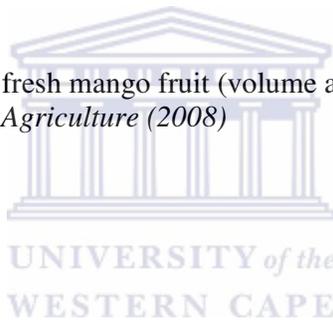


Figure 14: National markets for fresh mango fruit (volume and average price), 1995-2005
Source: National Department of Agriculture (2008)



3.5.3. Export market

Selling in the international markets is not as easy as selling in the domestic markets. For example, when selling in the European markets, farmers are confronted with a variety of compliance requirements. Phytosanitary requirements and food health regulations set by the EU legislation, marketing standards and certificates of compliance are some of the requirements. Ponte and Gibbon (2005) argue that producers in developing countries are expected to meet requirements that frequently do not apply to their domestic market. This creates a gap between the capabilities required for the domestic and international markets.

This gap becomes even wider when buyers, particularly global supermarkets chains and agro-food industries, call for consistent quality and supply, creating two quasi-hierarchical

governance structures. The first structure relates to monitoring and evaluation, which is required to ascertain that processes and products satisfy the required standards. The second structure involves buyers who invest resources in a small number of selected producers and help them comply with standards. These kinds of arrangements usually involve contracts (Cassani *et al.*, 2009).

The European Union has seasonal tariff arrangements that soar throughout the European peak harvesting seasons, quotas and specific tariffs, and various pricing policies that enable, amongst other things, government organisations to purchase produce should supply increase too quickly, and then free this excess back onto the market when supply declines again (SAMGA, 2008).



The immediate implication of these policies for South Africa is that an opportunity exists to supply mangoes to the European market in the off-season, as the produce will not compete directly with the European producers and thus would not be liable to a whole array of tariffs and other protective mechanisms. The EU and United Kingdom are the major export markets for South African mangoes (NDA, 2008).

Other destinations include the Middle and Far East and Canada. Middle East markets for South African mango include countries such as the United Arab Emirates and Saudi Arabia, while North American markets include countries such as the USA and Canada. These countries have no tariff barriers for mangoes originating from South Africa (NDA, 2008). Therefore, these countries offer South African exporters with potentially good markets for their mangoes. Countries such as Mali, Thailand and Peru have an extremely protected mango industry. They exercise soaring tariffs for mangoes and mango products that originate

from South Africa. The main reason for such protectionism is that these countries also have a domestic mango industry, and as such they aim to protect local producers (NDA, 2008).

Table 3.3 shows tariffs applied by various countries on mangoes from South Africa.



Table 3.3: Tariffs (2006) applied by various export markets on mangoes from South Africa

COUNTRY	PRODUCT	TYPE	APPLIED TARIFFS	AD VALOREM
United Kingdom	Fresh or dried mango	MFN duties	0.00%	0.00%
Germany	Fresh or dried mango	MFN duties	0.00%	0.00%
France	Fresh or dried mango	MFN duties	0.00%	0.00%
Netherlands	Fresh or dried mango	MFN duties	0.00%	0.00%
Israel	Fresh or dried mango (released from June to December)	MFN duties	0.00%	0.00%
	Fresh or dried mango (released from January to May)	MFN duties	282.84 \$/ton	16.52%
	Dried mango	MFN duties	25%	25%
United Arab Emirates	Fresh or dried mango	MFN duties	0.00%	0.00%
Saudi Arabia	Fresh or dried mango	MFN duties	0%	0%
Thailand	Fresh or dried mango	MFN duties	40%	40%
Indonesia	Fresh or dried mango	MFN duties	5.00%	5.00%
Malaysia	Fresh or dried mango	MFN duties	5.00% + 116.03 \$/ton	35.38%
China	Fresh or dried mango	General tariff	15.00%	15.00%
Japan	Fresh or dried mango	MFN duties	3.00%	3.00%
USA	Fresh or dried mango	MFN duties	66.00 \$/ton	7.93
		Preferential tariff for GSP countries	0.00%	0.00%
Canada	Fresh or dried mango	MFN duties	0.00%	0.00%
Burkina Faso	Fresh mango	MFN duties	20.00%	20.00%
Mali	Fresh or dried mango	MFN duties	20.00%	20.00%
Libyan Arab Jamahiriya	Fresh or dried mango	General tariff	0.00%	0.00%

Egypt	Fresh or dried mango	MFN duties	22.00%	22.00%
Botswana	Fresh or dried mango	Intra-SACU trade	0.00%	0.00%
Swaziland	Fresh or dried mango	Intra-SACU trade	0.00%	0.00%
Brazil	Fresh or dried mango	MFN duties	10.00%	10.00%
Venezuela	Fresh or dried mango	MFN duties	15.00%	15.00%
Peru	Fresh or dried mango	MFN duties	20.00%	20.00%
Costa Rica	Fresh mango	MFN duties	15.00%	15.00%

Source: SAMGA (2008)



There has been an overall decline in mango exports since the 2003/04 season. This was primarily due to a serious drought that was experienced at the time. Furthermore, there has been a general trend by producers to move away from the export markets because the producers are now selling their produce directly to the supermarkets at a fixed price. Selling produce to the local supermarkets involves less risk and, in most cases, packing costs are lower. In the 2007/08 season, most mangoes were destined for the Middle East markets.

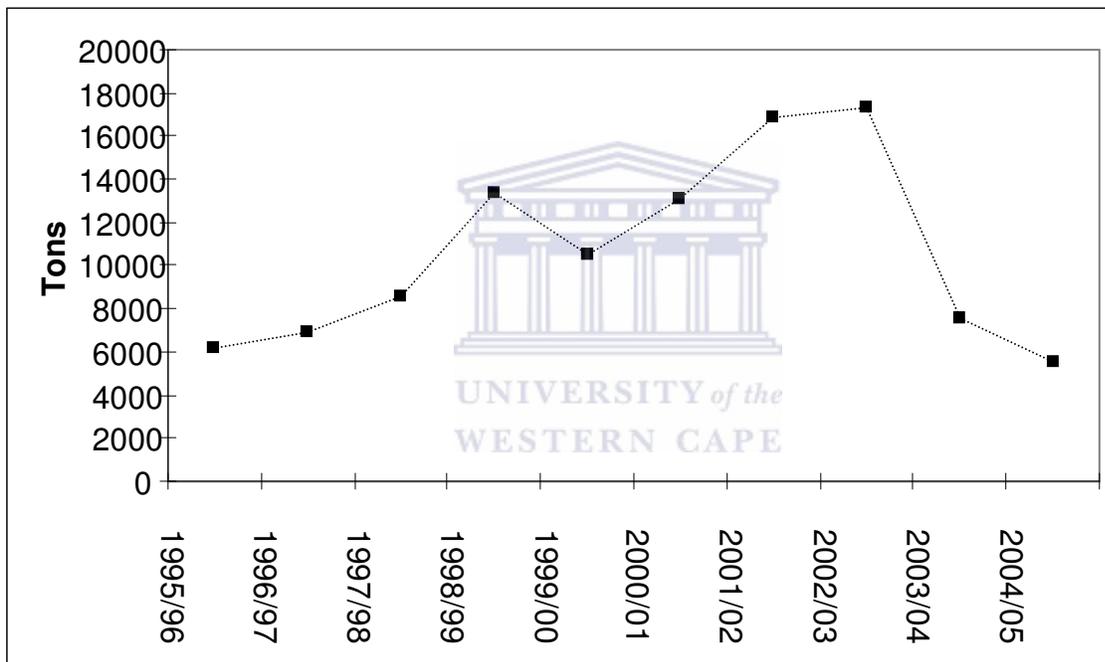


Figure 15: SA Total mango exports, 1995-2005
Source: National Department of Agriculture (2008)

To summarise the different mango output markets discussed in this section, Figure 3.9 gives a snapshot of mango markets and quantities sold over a period of 21 years to show variations in trends. Generally, there has been a fluctuation in all mango markets except the dried mango market, where supply has shown a gradual increase from 1989 to 2008. Between the 1998/99 and

2003/04 seasons, mango producers sold a large proportion of mango to atchar processors (annual average of about 22 000 tons). The atchar market was dominant, followed by juice processors. However, between the 2004/05 and 2007/08 seasons a larger proportion of mango was sold to juice processors (annual average of 25 000 tons), making it the dominant market, followed by dried mango. Why this shift from early to late season agro-processing markets? The likelihood is that there was an improvement in production technology or that consumer preferences shifted, in addition to other factors.

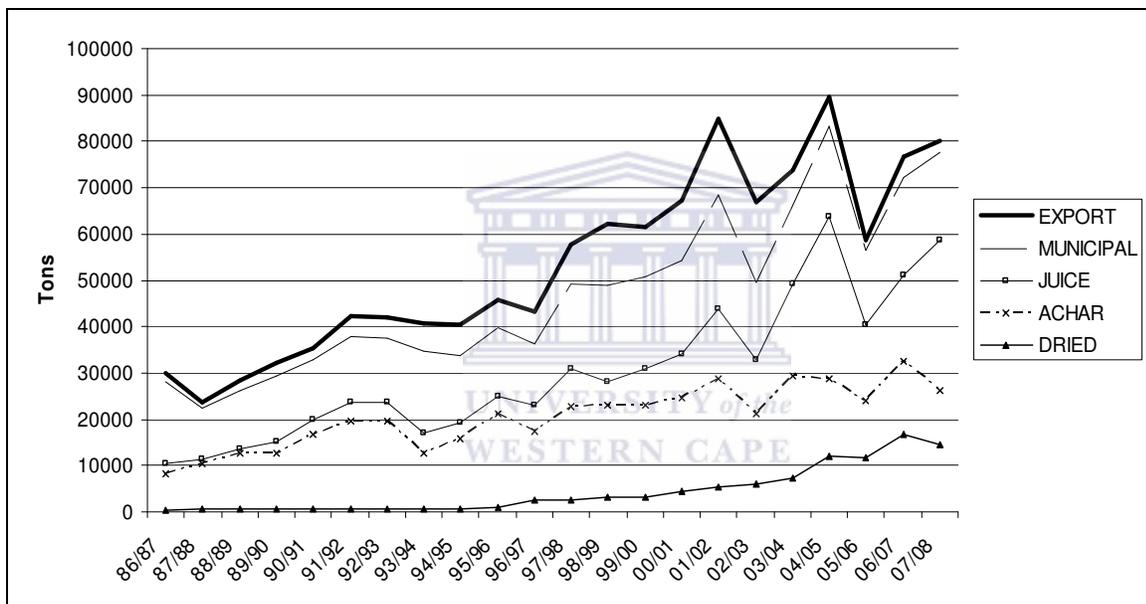


Figure 16: Snapshot of South African mango markets
Source: SAMGA (2008)

3.6. Conclusion

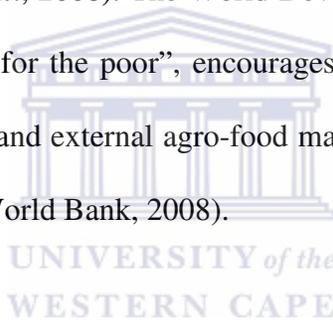
This chapter has mapped global and domestic production and trade in mangoes. It was established that India is the world's leading mango producer and forecasted figures were positive about India retaining its position in 2010. It was also established that the USA and the EU are both leading importers of mango. There are many mango cultivars that are popular in different parts of the world. Some of these varieties are not favoured by small-scale farmers because of problems such as poor shelf life, e.g. Manila in Mexico. However, one thing that this study did not address is related to the question about the position of small-scale farmers in the global value chain. This is primarily because country studies that are available are old and thus there is no updated information on this. However, in most developing countries the production of mango for export is recognised as an important source of income. For example, in Mali, Kenya and Burkina Faso, country studies on mango production and marketing revealed that small-scale farmers can sell their commodities and earn higher incomes.

In the South African overview, varieties also differ, but the Tommy Atkins, Keitt and Kent cultivars are traded most commonly. Participation in the mango output markets is subject to satisfying some requirements, especially for supermarkets and agro-food processing industries. However, the position of small-scale farmers in the mango value chain is not extensively documented. The costs related to complying with standards in the mango value chain are so high that farmers are not able to participate in the markets. Therefore, there is a need to study ways in which this cost can be reduced so that farmers can successfully sell their mangoes through formal participation.

CHAPTER FOUR: CONCEPTUAL FRAMEWORK

4.1. Introduction

The main objective of this chapter is to build a conceptual model to study the impact of transaction costs on small-scale farmers' participation in agricultural output markets. Improving small-scale farmers' access and participation in modern agro-food markets is topical in agricultural development debates. This access and participation are increasingly recognised as a route to higher incomes and thus a key ingredient to rural anti-poverty and anti-hunger strategies in developing countries (Alene *et al.*, 2008). The World Development Report of 2008, sub-titled "Making agro-food markets work for the poor", encourages developing countries to accelerate the development of efficient local and external agro-food markets to lift the rural poor to decent and sustainable living standards (World Bank, 2008).



Profound and complex changes are under way in the agricultural output markets. Food and agribusiness supply chains – once characterised by independence of actors – are becoming globally integrated and coordinated systems within a large variety of multifaceted relationships (Bordewijk, 2006). This has two implications for small-scale farmers: firstly, farmers, especially those in developing countries, are now linked to agro-food industries and consumers in the rich countries (Kirsten & Kherallah, 2002) and, secondly, this affects the methods of agricultural production, agro-food processing and delivery to wholesale and retail market outlets (Reardon & Berdegúe, 2002). What these two points underscore is that participation in these markets is subject to meeting a range of requirements, e.g. norms and standards related to product quality, traceability and the safety of products (Kirsten & Kherallah, 2002), timely and consistent all-year

round supply (Louw *et al.*, 2008), and the use of sustainable production and handling methods (Bordewijk, 2006).

Costs that influence small-scale farmers' participation in markets (structured and unstructured) are referred to as transaction costs. These costs might arise from household characteristics and factors outside a household's control (Makhura, 2001). This chapter draws on theoretical and empirical work to develop a theoretical framework to study the impact of transaction costs on small-scale farmers' participation in agricultural output markets.

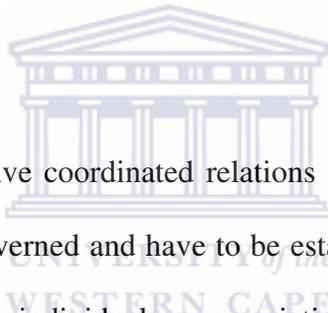
The remainder of this chapter is structured as follows: The next section presents a high-level overview of marketing channels in which small-scale farmers engage. It then moves on to consider, from the viewpoint of these farmers, the types and significance of transaction costs that arise in agro-food markets. The sources of transaction costs receive attention in a subsequent section. Before outlining strategies to reduce the transaction costs that smallholder farmers face, ideas are formalised in a Transaction Cost Economics model. The conclusion pulls together key insights to guide our empirical strategy in the rest of this study.

4.2. Small-scale farmers and marketing channels

Small-scale farmers sell their agricultural commodities either in formal (or structured) markets (such as the agro-processing firms and supermarkets) or informal markets (such as roadside traders and within the communities). The choice of marketing channel depends on a number of aspects. These include the existence of markets; prices offered in the markets; farm gate-to-

markets distances; and the potential of market demand to absorb the output supplied (Montshwe, 2006).

Transactions in informal markets are usually free from contractual bonds between small-scale farmers and the buyers. Such informal trade is more common in less developed markets, where standardisation and quality requirements are generally unimportant. Farmers can sell their produce without the need for any *ex ante* and/or *ex post* relationship with the buyers. The costs of accessing and participating in these markets are normally low, and this ease of entry and exit explains why small-scale farmers often participate in these markets (Louw *et al.*, 2008; Markelova *et al.*, 2009).



Formal markets, by contrast, involve coordinated relations with buyers through which product quality, safety and logistics are governed and have to be established and maintained. Structured contracts exist between farmers, as individuals or associations, and varieties of agribusinesses. Formal contracts set the “rules of the game” between transacting parties, but the details of written agreements might vary (Key & Runsten, 1999).

Under contract farming, agro-food companies enter into binding contracts with farmers to buy a specific quantity and quality of produce at a designated price. The price may be fixed at planting time or determined by market demand and supply conditions at harvest time. Factors that determine a small-scale farmer’s decision to participate in the formal markets might include: access to information on market requirements (for example governing product quality, frequency and logistics of supply), the ability to comply with such requirements on a consistent basis and

the capacity to negotiate and manage contractual arrangements (Key & Runsten, 1999). In many instances, farmers benefit from access to technological information and extension services provided by the agro-food companies (Key & Runsten, 1999).

Figure 17 schematically outlines channels through which small-scale farmers interact with agricultural output markets and the relative ease/difficulty of participation in these markets. It is relatively easier for small-scale farmers to participate in the informal markets compared to the formal markets. As mentioned above, a range of requirements in the formal markets make it difficult for farmers to participate there. On the other hand, it is easier for farmers to sell in the informal markets.

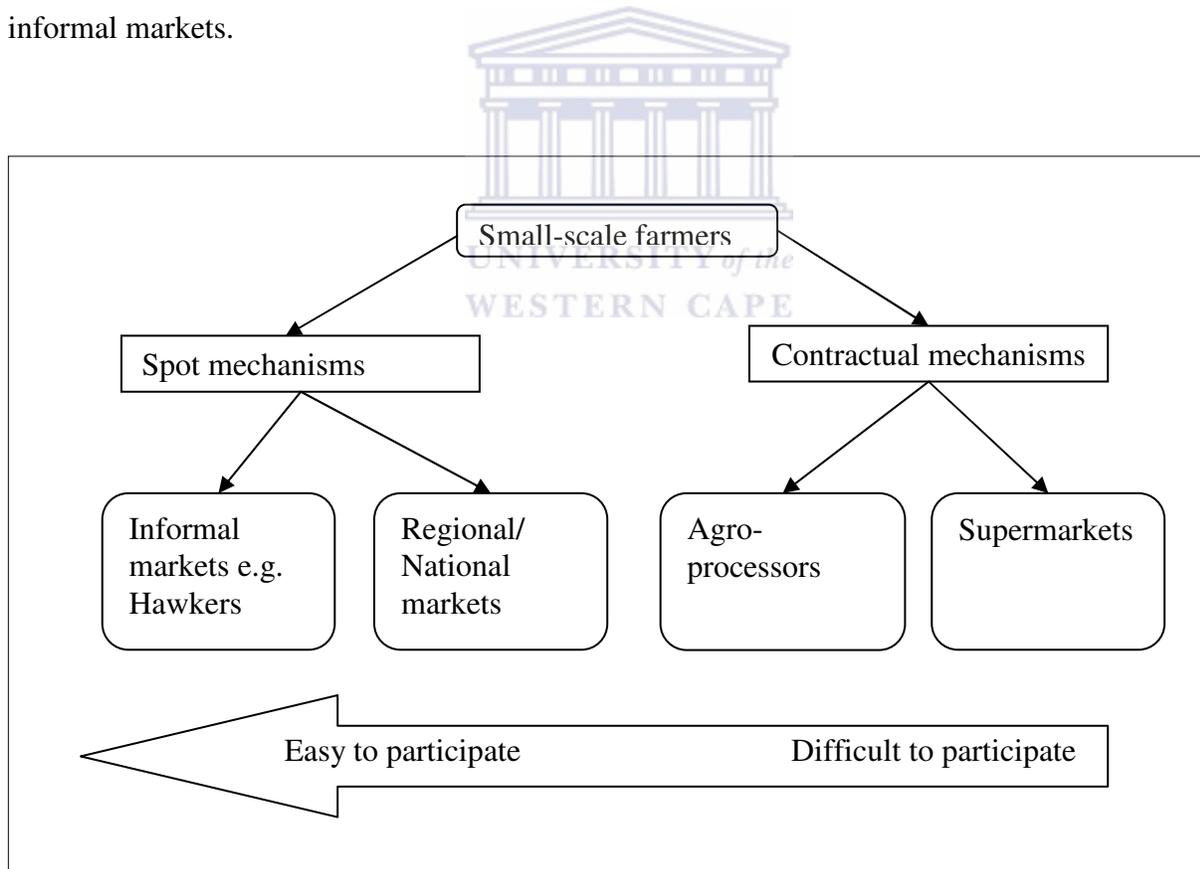
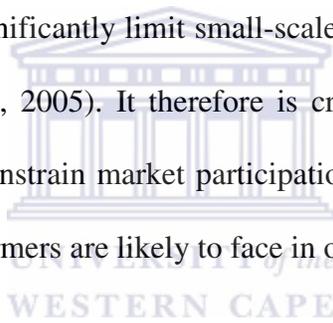


Figure 17: Marketing options for small-scale farmers
Source: Louw et al. (2008)

As illustrated above, multiple market outlets or channels exist for small-scale farmers. A growing body of empirical research shows that small-scale farmers are unable to meet the requirements in higher-return, modern agricultural output markets (see Louw *et al.*, 2008; Makhura, 2001; Ruben *et al.*, 2008). The evidence shows that requirements in structured markets bring along a set of costs that small-scale farmers have to overcome to participate successfully. Although these costs are important in unstructured markets (Bellemare & Barrett, 2006; Key, Sadoulet & De Janvry, 2000;), they are significantly lower than in structured markets. These costs determine both the decision to participate in markets and the degree of participation, in addition to output prices and other institutional arrangements between buyers and sellers (Pingali *et al.*, 2005). Transaction costs significantly limit small-scale farmers' participation in profitable marketing channels (Pingali *et al.*, 2005). It therefore is crucial to know how the nature and magnitude of these costs might constrain market participation. The following section examines the transaction cost barriers that farmers are likely to face in output markets.



4.3. Agro-food output markets and transaction costs

An important determinant of whether resource-poor small farmers participate in agro-food markets and what returns they might derive from such engagements is associated with transaction costs (Key & Runsten, 1999). Many small-scale farmers face prohibitive transaction costs and this is a disincentive to them to fully exploit higher-return market opportunities (Poulton, Kydd & Dorward, 2006, Pingali *et al.*, 2005). Excessive transaction costs could be behind the lack of market development or account for market failure. In this context, lower

transaction costs ought to induce market development and integrate smaller farmers into rewarding agro-food output markets more tightly.

Transaction costs are defined as the cost of arranging a contract *ex ante* and monitoring a contract *ex post* or, more generally, the costs of running the economic system (Maltsoglou & Tanyeri-Abur, 2005). However, the more relevant definition of what transaction costs are in the context of this study is provided by Eggertson (1990), who defined transaction costs as the costs that arise when individuals exchange ownership rights for economic assets and enforce their exclusive rights. Eggertson (1990) and Loader and Hobbs (1996) identified the factors that generally give rise to transaction costs as follows:

- The search costs involve locating a potential contracting partner and the prices, together with the quality of the resources, in which they have property rights (this includes personal time, travel expenses and communication costs)
- Bargaining determines the position of the contracting parties, especially when the prices (including wages, interest rates, etc.) are not determined exogenously.
- Screening cost refers to the uncertainty regarding the reliability of the potential buyers and the uncertainty about the actual quality of the commodity or service.
- Transfer costs involve legal, extralegal or physical constraints on the movement and transfer of goods or services. This normally involves transportation costs, storage and handling.
- Monitoring costs are related to the uncertainty that the trading partners will abide by their terms of contract.

- Enforcement costs involve the uncertainty about the level of damages or injury that can be encountered by the transacting party resulting from contractual non-compliance, problems in exacting penalties through bilateral agreements or through the use of third parties.
- Making a formal (or informal) contract, defining the obligations of the contracting parties, also induce transaction costs.

It is possible to distinguish tangible (transportation costs, communication costs, legal costs, etc.) from intangible (uncertainty, moral hazard, etc.) transaction costs (Holloway *et al.*, 2000). Some of these costs are direct (observable), while others are indirect (less observable or completely unobservable). Transportation costs are a good example of direct costs that are positively correlated with longer distances to markets. The indirect costs are associated with gathering market information, seeking exchange partners, ascertaining their trustworthiness, negotiating, and monitoring agreement and enforcing contracts (Pingali *et al.*, 2005).

In agricultural output markets, the main constituent of transaction costs is likely to be the direct costs associated with the transportation of the commodity and storage. These will be peculiar to and vary by individual market structures and equipment, distances between market points, and principal point of production (Gebre-Madhin, 2001). Since small-scale farmers presumably have less access to information and information services, and this differs from one farmer to another, small-scale farmers are likely to face higher unit transaction costs (Gebre-Madhin, 2001).

Transaction costs might also be commodity specific (Pingali *et al.*, 2005). For example, delicate products such as milk and mango may need storage space and a refrigerated supply chain. Marketing costs for these perishable agro-foods tend to exceed costs for less perishable dry commodities such as grains (Gabre-Madhin, 2001; Pingali *et al.*, 2005). Asset specificity also adds to transaction costs – especially human capabilities assets associated with skills in negotiation, information gathering and management (Williamson, 1979).

Key *et al.* (2000) further distinguish fixed from proportional transaction costs. The concept of fixed transaction costs implies that, regardless of the transaction made, the costs involved remain fixed. That is, the same costs are experienced once the decision to exchange has been made. For example, the information costs of finding the markets will be the same regardless of whether the household sells more or less of a particular commodity (Makhura, 2001). Proportional transaction costs, on the other hand, depend directly on the nature of the transaction, e.g. the quantities of assets used to deliver the products to the markets depend on the amount of products to be delivered at the markets (Key *et al.* 2000; Makhura, 2001).

According to IFAD (2003), there are three factors that propagate transaction costs for small-scale farmers: physical access to the markets (which includes long distances to markets, bad roads, poor rural infrastructure); the structure of the market (asymmetry of relations between farmers, market intermediaries and consumers); and the producer's lack of skills, information and organisation. Price risk and uncertainty, difficulties of contract enforcement, insufficient number of middlemen, gathering dispersed small quantities of agricultural produce and market-specific requirements (e.g. standards, quality and quantity), among others, also perpetuate transaction

costs that small-scale farmers confront when selling in more structured markets (Magingxa & Kamara, 2003).

Large agro-food corporations increasingly dominate modern agricultural output markets (Louw *et al.*, 2008). These include mainly, but not exclusively, large groups of supermarkets, retailers and agro-food processors. Resource-poor small farmers have an inferior bargaining position when engaging with such markets. This results not only from the “largeness” and “fewness” of the marketing agents that buy from them, but also from the sophisticated technological and competitive conditions under which agricultural production and marketing take place (Ruben *et al.*, 2008). The following paragraphs discuss a range of factors that influence the nature and level of transaction costs that small-scale farmers face.

4.3.1. Household specific factors

Pingali *et al.* (2005) identified the household factors that influence small-scale farmers’ access and participation in the markets. Household aversion to risk and uncertainty, social networks and organisation, age, gender and education are some of the factors that determine how small-scale farmers interact with markets, specifically by influencing the information seeking, negotiating, monitoring and enforcement activities of the households (Pingali *et al.*, 2005).

According to Pingali *et al.* (2005), age, gender and education can influence the way in which transaction costs affect households, e.g. age can often be indicative of farming experience, which makes certain information and search activities easier and cheaper. Education matters in terms of searching for information and reduces the amount of time taken to process and act on the

information provided. Gender, on the other hand, influences transaction costs because of the traditionally unequal positions that females and males occupy in society. Males are more likely to have rights to land, attend traditional courts, and hold positions that afford them to network with each other and thus overcome some of the transaction costs. On the other hand, females are more likely to be faced with higher transaction costs (Makhura, 2001).

4.3.2. Spatial isolation and poor rural infrastructure

Small-scale farmers are concentrated in remote rural areas where infrastructure deficiencies are common (Hallstrom & Karanja, 2001; Macheche & Moyo, 2008). Reliable road networks, communication technology and storage facilities are some of the important infrastructure that enable farmers to participate in the markets. Most rural roads are in a bad condition (Macheche, 2004; Macheche & Moyo, 2008), and communication infrastructure and storage facilities are either non-existent or dysfunctional (Hallstrom & Karanja, 2001). Macheche & Moyo (2008) have indicated that infrastructure deficiencies in rural areas, especially roads, result in expensive transportation costs for small-scale farmers. Poor communication technology and infrastructure leads to increased costs associated with gathering market information (Mburu & Massimo, 2005).

4.3.3. Transportation and longer distances to markets

Apart from the fact that the majority of the small-scale farmers lives in remote rural areas, they do not have access to own transport, which might reduce transportation costs (Macheche &

Moyo, 2008). This is exacerbated by the fact that there are very few reliable transporters available in the rural areas (Machethe & Moyo, 2008). This lack of transportation results in farmers incurring costs to deliver their commodities to markets. Longer distances to the market also impose higher transportation costs (Pingali *et al.*, 2005). Transportation costs also vary, depending on the nature of the commodity (e.g. grains versus perishable commodities such as bananas) (Pingali *et al.*, 2005). Perishable commodities require specialised types of transportation (e.g. refrigerated transportation systems for mangoes) and thus the transportation costs are likely to be higher than for other commodities with longer shelf lives (e.g. maize).

4.3.4. Lack of information

Market information is also a very important aspect towards ensuring successful market participation. Montshwe (2006) indicated that large numbers of small-scale farmers do not have access to information because of inefficient communication systems (in rural areas) and their low levels of literacy. Information is important for the following reasons, as summarised by Frick and Groenewald (1999):

- It creates stimuli by indicating market opportunities
- It stimulates competition among suppliers
- It promotes the adaptation of suppliers to the development of demand
- Preconditioning for planning and control of market interventions

If farmers do not have information about prevailing market conditions they have to incur costs to acquire such information (Magingxa & Kamara, 2003). The costs of acquiring information can be related to purchasing information, e.g. newspapers, or consulting market agents, the opportunity costs of time spent searching for information, etc. Some of these costs can be tangible (e.g. price of document with market information), but some are intangible (e.g. opportunity cost of time spent looking for that information).

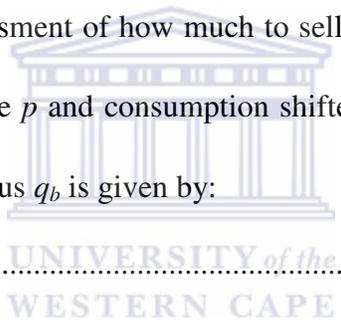
4.3.5. Standards in relation to food quality and safety

Agro-food industries have established their own private systems of grades, standards and labels that small-scale farmers should satisfy to participate successfully (Louw *et al.*, 2008). These regulations have been imposed by the agro-food industries to satisfy consumer demand and create niche markets (Kirsten & Kherallah, 2002). However, these trickle down to farm level and influence how farmers should produce and handle their commodities. Small-scale farmers have to incur costs related to gathering information, production, specialised packaging and specialised transportation needs (refrigerated transport), depending on the nature of the commodity (Pingali *et al.*, 2005). These involve higher costs that small-scale farmers are often unable to overcome (Kirsten & Kherallah, 2002). Recent trends in the national, regional and international agro-food markets show that most small-scale farmers do not participate due to the poor quality of their products (Kirsten & Kherallah, 2002; Machethe & Moyo, 2008).

4.4. Theoretical model of transaction costs

According to Vakis, Sadoulet and De Janvry (2003), a household's decision process can be divided into three phases. The first phase is during the planting season, when household h chooses the optimal allocation of resources to determine the total quantity to be produced. These resources might include labour, land and other exogenous incomes. The household supply function is thus represented by $Q(p, w, z_b^q)$, where p and w are output and variable input expected prices respectively, and z_b^q is fixed factors of production. The second decision phase for households is during the harvest season, when household h 's realisation of effective total quantity produced Q_b and an assessment of how much to sell and consume. Home consumption c_b is a function of the product price p and consumption shifters z_b^c , that is $c_b = c(p, z_b^c)$. Based on this, household h 's market surplus q_b is given by:

$$q_b = Q_b - c_b \dots\dots\dots (1)$$



Assuming that a particular household h sells its marketed surplus q_b in several transactions of equal size. The number of transactions for a particular household n_b depends on the marketed surplus and on fixed transaction costs determined by z_h^n , *i.e.*, $n_b = n(q_h, z_h^n)$. As such, the quantity of transactions i is given by:

$$q_{hi} = \frac{q_b}{n_b} \dots\dots\dots (2)$$

Where q_{hi} is the quantity sold by household h in its i^{th} transaction. The final decision for the household is on which market to sell its marketed surplus and specifically each of the individual sales q_{hi} . Focussing on households that are net sellers and dropping the household subscript h for

simplicity (so that i indicates both the transaction costs and the household); then, if there exist j number of markets where a farm household can sell q_i , the farm household's decision is based on three factors.

Firstly, selling in market j for given transaction i is associated with proportional transaction costs TC_{ij}^p per unit of product. These costs are function of the distance d_{ij} and time m_{ij} to reach market j , as well as of other individual-specific characteristics z_{ij}^p , such as road quality. Proportional transaction costs are thus given by:

$$TC_{ij}^p = TC^p(d_{ij}, m_{ij}, z_{ij}^p) \dots\dots\dots (3)$$

Secondly, the household considers expected price p_{ij} to be received on each candidate market j . This price is decomposed into:

$$p_{ij} = \bar{p} + B(q_i, z_i^b) \dots\dots\dots (4)$$

Where \bar{p} is a market-specific exogenous price and $B(q_i, z_i^b)$ is the potential mark-up that the household expects to receive. This mark-up depends on the quantity sold, q_i , and on other bargaining-related attributes such as ability, experience and product quality z_i^b . Finally, selling on market j is associated with fixed costs TC^f that are invariant on specific quantity, and includes costs such as searching for potential buyers and obtaining information about prices, markets or types of contractual agreements available in different markets.

Based on the above, and for given transaction i , a farm household chooses to sell q_i in the market j that yields the highest net profits among $k = 1, \dots, j$ markets. This can be expressed as:

$$j_i = \arg \max \{ \Pi_{ik} = q_i \cdot (p_{ik} - TC_{ik}^p - TC^f(z_{ik}^f)), k = 1, \dots, j \} \dots\dots\dots (5)$$

Equation (5) above offers a simple framework to empirically explore the role of transaction costs in market choice, or rather the extent to which transaction costs influence sales in different markets. For this study, the focus is on two different types of markets – formal markets (supermarkets, agro-processors, etc.) and informal markets (traders, consumers in the community, etc.).

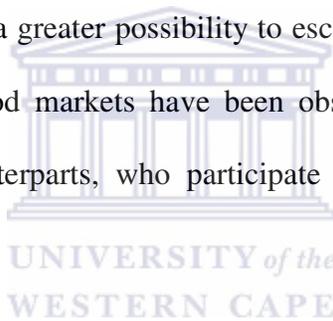
4.5. Reducing transaction costs faced by small-scale farmers

As stated previously, transaction costs create the frequent occurrence of market failures and incomplete markets (Kirsten & Kherallah, 2002). Therefore a reduction in these costs is important to overcome market failures (Kirsten & Kherallah, 2002; Meese, 2005). Overcoming transaction costs can lead to well-functioning agricultural marketing systems that can reduce the cost of food and the uncertainty of supply, and improve the food security of poor and non-poor households (World Bank, 2008). These marketing systems can also transmit signals to farmers on new market opportunities and guide their production to meet changing consumer preferences for quantity, quality, variety and food safety (World Bank, 2008).

As sellers of agro-food outputs, the small-scale farmers depend on markets for their incomes (Dorward & Kydd, 2005). Although there is a growing body of literature that shows the diversity of sources of income for most rural households, farm incomes still form the most integral part of their livelihood (Baipheti & Jacobs, 2009). According to Lyne (1996), small-scale farmers who

participate in high value agro-food markets earn farm incomes that are higher than their counterparts who do not participate in these markets. Matungul, Lyne and Ortmann (2001) also showed that small-scale farmers' participation in formal agro-food markets results in higher crop incomes.

The main contention is that if small-scale farmers' participation in the markets increases, their likelihood or probability of higher incomes increases. However, if the surpluses are large enough and markets function more reliably, small-scale farmers are also likely to absorb non-family labour. Access to the markets thus changes the livelihood diversification mix of the small-scale farmers over time, and this offers a greater possibility to escape deep rural poverty. Households with less involvement in agro-food markets have been observed to engage in more erosive-coping strategies than their counterparts, who participate actively in the agro-food markets (Rehber, 1998).



Despite being producers of food, many poor rural households (including many smallholder farmers) are also increasingly net consumers and they tend to purchase their food from the expanding network of supermarkets in nearby towns and cities (Baiphethi & Jacobs, 2009; Goetz, 1992). This implies that, by selling their products in the markets (supermarkets in particular), small-scale farmers can also contribute towards food availability for other local dwellers.

We have now established the connection between small-scale farmers' participation in the markets and their livelihood strategies and living standards. There is a need for transaction costs

to be reduced so that farmers participate in the markets for the range of reasons outlined above. The most important question is, how can these costs be reduced? In trying to answer this question, the following few paragraphs draw insights from different studies to establish ways to reduce transaction costs.

The provision of physical and legal infrastructure, information and education through extension and agricultural research may lower transaction costs (Matungul *et al.*, 2001). This can lead to the achievement of rural economic growth through improving small-scale farmers' participation in agro-food markets. However, this also requires small-scale farmers to participate in other rural markets, such as land, credit, input, and product and contractor services (Matungul *et al.*, 2001).

Delgado (1997) also identified government policies that would substantially enhance market participation by small-scale farmers in developing countries. Therefore, policies are required that affect rural marketing institutions and property rights, and physical infrastructure that deals effectively with transaction cost obstacles within the communal areas.

Collective action also serves as a way of reducing transaction costs (Markelova *et al.*, 2009). Small-scale farmers act collectively through farmer and commodity associations, among other forms of organisation, to reduce transaction costs. However, if the costs of organising are greater than the costs of transacting individually, then it is irrelevant for small-scale farmers to organise themselves. One particular issue put forward as a potential drawback of farmers becoming organised is free-rider behaviour by other members in the organisation. This occurs when members do not contribute towards the formation of the organisation but derive benefits from

associational membership, e.g. through information exchange. Other negative externalities involve the narrow radius of trust, whereby farmers do not trust other people who do not belong to the same organisation, even if they can benefit from a potential relationship (Fukuyama, 1995).

Downstream linkages through contracts are also mechanisms identified to reduce transaction costs. Supermarkets are good examples of such vertical co-ordination mechanisms that can improve small-scale farmers' participation in the markets (Reardon & Berdegúe, 2002; Reardon, Timmer & Berdegúe, 2004). The widespread proliferation and growth of supermarkets in developing countries provides an opportunity for small-scale farmers to bypass market failures and substantially reduce transaction costs. The contractual agreements between farmers and supermarkets can enhance farmers' access to credit, finance, inputs and technologies, as well as managerial expertise (Reardon *et al.*, 2004). However, these require small-scale farmers to satisfy specific requirements.

4.6. Conclusion

This chapter has demonstrated that participation in agro-food markets provides smallholder farmers with a pathway to sustainable livelihoods. However, if resource-poor small farmers are to optimise their returns from participation in agro-food markets, they need to be aware of and overcome the costs attached to market participation. These costs are commonly defined as transactions, as they arise from market exchange activities and might be a major hurdle to rural growth and development. In an effort to better understand the channels through which transaction costs could affect small farmers' market participation, we have drawn on insights

from pertinent contributions to the literature to develop a conceptual framework of transaction cost analysis.

The theoretical underpinnings of transaction cost economics and the impact of transaction costs on small-scale farmers' participation in the output markets have been discussed. Transaction costs manifest in a complex and often interactive way, and thus are difficult to identify and measure because they are not easily observable. In trying to capture the impact of transaction costs on market participation, only variables that influence transaction costs are used, and not the actual transaction costs per se.

Although transaction cost analysis points to the importance of incorporating costs that farmers incur in selling their commodities, it only focuses on one end of the node. In the modern globalised agro-food markets, farmers have virtually no power in determining the terms of sale. As already outlined in the introduction to this chapter, agro-food industries have become more powerful and dictate the terms of contract/sale for farmers. Thus, to make the transaction cost framework a more powerful and useful tool, power relations in the commodity chains must be factored into the current framework.

CHAPTER FIVE: DATA COLLECTION AND ANALYSIS APPROACHES

5.1. Introduction

There is a large and growing body of research on the potential benefits of small-scale farmers' participation in the agricultural output markets and the need to lower the transaction costs they face. These studies vary in their empirical details, but invariably draw on the following dominant conceptual approaches to frame their data collection and analysis techniques: collective action (Markelova *et al.*, 2009) theorists argue that the disadvantage rests on small farmer dispersion and that associations in which small farmers participate actively might help them to thrive despite the formidable barriers inherent in competitive markets; value chain analysis (Kevin *et al.*, 2006) places greater emphasis on forces that might dominate the backward (input suppliers) or forward linkages (powerful buyers); and transaction cost economics (TCE), which looks at how to overcome transaction cost barriers to small-scale farmers' participation in agricultural output markets (Jagwe *et al.*, 2010; Makhura, 2001; Matungul *et al.*, 2001). This study contributes to TCE with the aid of an insightful and carefully documented case study of the transaction costs that resource-poor small mango farmers' face.

The main purpose of this chapter is to describe the empirical research methods. Following Leedy and Ormrod (2004), we demonstrate the compatibility of our research methods with the need to clearly answer our stated research questions. The rest of this chapter is organised as follows: the next section looks at key lessons from empirical methods in other studies, and the choice of

study areas, and this is followed by the sampling procedure, the data collection methods, analytical techniques and summary. In the other sections we outline our own analytical methods.

5.2. Methodological approaches in other research: key lessons

In this section we draw lessons from the research methodologies (data gathering and analytical methods) used in previous studies on smallholder farmers and their participation in output markets. The main criteria used to select a study for inclusion, in addition to the focus on small-scale farmers, were the following: publication in a scientific journal; while this probably excludes a vast number of focused studies, the chief benefit of this selection rule lies in scrutiny through the peer review process, thus adding to methodological reliability; focus on small livestock and crop farmers; in the light of the limited research on resource-poor mango farmers, it was decided to broaden the selection to other farm commodities; thirdly, and closely related to the last reason, we biased the selection in favour of developing countries. Table 5.1 offers an overview of a sample of global and South African studies. It illustrates how the identified research problem (which defines the scope of the study) relates to sample design/data collection strategies and applied analytical methods (econometric techniques).

The studies summarised in Table 5.1 share three main objectives in common with regard to the participation of resource-poor small farmers in agro-food output markets: (i) to estimate the probability of participation – what is the likelihood of participation? (ii) to determine the level of participation – what is the extent/depth of participation? and (iii) to identify the factors that influence the probability and the level of participation. Almost all studies, except the study by Khushk and Smith (1996), focus on how much transaction costs might be hampering small-scale

farmers' participation in agricultural output markets. Montshwe (2006) and Uchezuba, Moshabela and Digopo (2009), for example, investigated the probability of small-scale livestock farmers' participation in the agricultural output markets. Makhura (2001) and Matungul *et al* (2001) researched the effect of transaction costs on small-scale crop farmers' participation in the markets. Published studies based on research conducted in Uganda, Burundi, Rwanda and Pakistan have been included if these focused on subtropical commodities.

5.2.1. Sampling and data gathering techniques

The selection of studies reported in Table 5.1 adopted fairly similar research methods, but these were not always described with the same systematic detail. Probability sampling is certainly the most commonly used sampling design and data collection method. A distinct advantage of this approach is that it enables researchers to generalise findings from a randomly selected representative sample to the entire population of small-scale farmers (Masuku and Sithole, 2009). Another common design approach is stratification. There are two main questions concerning the stratified sampling technique: (i) how is stratification conducted? (ii) How does this affect the representativeness of the sample (Van Eijk *et al.*, 2004)? Answering the first question, all of the studies reported in Table 5.1 stratified on the basis of geographical location. Montshwe (2006), for instance, used distance to the nearest market to divide the regions into strata, while Matungul *et al.* (2001), Makhura (2001), and Randela, Alemu and Groenewald (2008) divided the study areas into small sub-regions and then conducted simple random sampling within each sub-region.

Answering the second question, the strata are selected so that they are similar (homogenous), so that there is little or no variation within the strata. Stratification controls the distribution of the sample size in the strata and thus ensures adequate sample sizes for subgroups of interest, while improving the precision of the overall estimates. However, to improve the precision, units within the strata should be as homogenous as possible for the characteristics of interest (Neerchal, Lacayo & Nussbaum, 2007). This technique requires the use of sample weights, but the authors do not report such weights.

Weighting is used to transform the realised sample into estimates of the reference population, improving the precision of the estimates. Weights usually come from two sources: firstly, from outside the survey and, secondly, from within the survey itself, to provide the size or output of a farmer or sector within which the farmer operates. The two main weighting procedures used involve one-stage and two-stage schemes. In the first case, weight is associated with each reporting unit, in order to take into account its relative importance inside the sample, and in the second case a firm-specific weight is used to calculate strata-level results, further aggregating the data with some external sources in order to obtain sectoral aggregates (Homan, 1991).

The sample sizes of the studies reported on in Table 5.1 vary considerably, with the smallest sample size being 60 observations by Uchezuba, Moshabele and Digopo (2009) and the highest sample size 1 406 in Jagwe *et al.* (2010). The question of sample size has long been under scrutiny in the field of statics. For example, Neerchal *et al.* (2007) studied the optimal sample size for obtaining a confidence interval of a pre-assigned precision (or length) for the proportion parameter of a finite or infinite binary population. The findings of their study revealed that

increasing a sample size does not necessarily increase the confidence level of the sample. More precisely, the confidence level of an interval of fixed length does not increase as the sample size increases. Therefore they concluded that increasing the sample size can be costly, both in terms of resources and results, if additional samples drive the confidence levels down.

To collect data, these kinds of studies generally use a structured questionnaire administered to each sampled unit (usually the household). Makhura (2001) and Montshwe (2006) identified the household as unit of observation and interviewed the designated household heads, sometimes with participation from other household members to reduce or eliminate the missing information problem common that is in rural primary data collection.



Table 5.1: Summary of selective empirical studies in terms of *research scope, data collection and analytical methods*

	Study purpose/research question	Sample design and information collection method	Data analysis method
Matungul <i>et al.</i> (2001)	Identify constraints to effective market participation among small-scale farmers in Impendle and Swayimana districts of KwaZulu-Natal.	Multi-stage sampling technique: stage 1 defined two geographic strata; stage 2 randomly sampled 120 farm household from each district. Administered a structured questionnaire to 240 households.	Two-stage least squares regression of choice of marketing methods (dependent variable) and household and farm activity explanatory variables; second stage regressed, crop income as dependent variable on several explanatory variables, including marketing methods index. Fit of model with R-square for choice of marketing methods model 0,22 compared to fit 0,33 for crop income model.
Jagwe <i>et al.</i> (2010)	Determine the household's decisions to participate in the banana markets in communal areas of Burundi and Rwanda.	Stratified random sampling method: stratification based on five rural regions/districts in Burundi and seven in Rwanda. Randomly sampled 150 households in each stratum, but realised sample yielded 1 460 households. Administered structured questionnaire.	Bi-variate probit model with decisions to participate (=1) and not (=0); key explanatory variables: asset ownership, time taken to reach nearest market, household demographic variables and participation in farmer association. Model fit established through log likelihood ratio test – statistically significant at 1%.
Uchezuba <i>et al.</i> (2009)	Estimate the probability of small-scale farmers selling their livestock to more profitable mainstream markets in the Northern Cape, South Africa.	Stratified sampling technique. Define strata in terms of five geographic regions in Northern Cape; randomly sample 60 households across all districts. Administered structured questionnaire.	Binary logistic model, probability of farmers selling to mainstream markets (P = 1) and probability of selling to speculators (P = 0). The model correctly predicted 87% of the results, with Pesaran-Timmermann test of 4.4693 [p = 0000] and Wald test of 3.1319 [p = 0.077] showing that the logistic regression model was appropriate, and was a good fit for the data.
Komarek (2010)	Determine factors influencing market participation decisions among Ugandan banana growers.	Multi-stage stratified sampling technique: defined strata in South-Western Uganda; randomly sampled 131 households across all strata.	Double-hurdle model: firstly, <i>Probit model</i> with decisions to participate (=1) and not (=0) was estimated with the following key explanatory variables: distance to the

		Administered a structured questionnaire.	markets, prices at the markets, land size, crop yield and dependency. A <i>Truncated model</i> was then estimated to explain the volume of sales, with the same key variables as in probit. Good model fit with pseudo-R-squared of 85%.
Fafchamps and Hill (2005)	Examine farmers' decision to sell agricultural outputs at the farm gate or travel to the market.	Random sample survey based on sampling frame of Ugandan household survey. Randomly sampled 300 rural coffee producers from the household survey.	Probit regression model to estimate the farmers' decision to sell at the farm gate or travelling to the market. The measure of robustness in this study is the likelihood ratio and pseudo R-squared.
Randela <i>et al.</i> (2008)	Identify factors that influence the degree of commercialisation or market participation of cotton producers in Moutse and Nkomazi in Mpumalanga province	Systematically sampled 200 households across three geographic regions; realised sample came to 177 with 33 refusing to participate. Administered a structured questionnaire.	Logistic regression model applied within the transaction costs framework, with dependent variable household commercialisation ($P = 1$) and ($P = 0$); explanatory variables included demographic characteristics, resources (e.g. land size) and transaction costs. Both Pesaran-Timmermann test statistic (6.5070 [$p < 0.001$]) and Log likelihood ratio test (63 [$p < 0.001$]) significant, showing that at least one of the determinants of household commercialisation was significant.
Montshwe (2006)	Investigate the probability of small-scale cattle farmers participating in mainstream markets and measure the impact of change of selected variable on the probability to participate.	Stratified sampling technique: strata based on distances to the nearest market. Combined random sampling with selective snowball sampling technique in areas where smallholders could not be easily identified; realising total sample of 150 households. Administered a structured questionnaire.	Logistic regression model to analyse probability of small-scale cattle farmers' participation ($P = 1$) in the mainstream agricultural markets against ($P = 0$) otherwise. Explanatory variables include: market information, farming system, lobola, remittances, income, dependency ratio, household size and member of farmers' organization. The study used principal component analysis to validate the results.

			Used principal components analysis to validate model (explains 67.22% of the variance and this was significantly higher than the cut-off percentage of 50%).
Makhura (2001)	Determine the role of transaction costs in participation of smallholder farmers in maize markets.	Stratified random sampling drawn from five regions in Northern Province (Limpopo). Sample frame constructed in consultation with extension officers; randomly sampled of 157 households. Administered a structured questionnaire.	Selectivity procedure was applied to determine the factors related to transaction costs that influenced the decision to participate and level of participation in the maize markets. Applied selectivity models similar to Heckman's two-stage procedure. Step 1: estimate Probit models to isolate determinants of the decision to sell in the markets. Step 2: estimate OLS models to determine factors significantly contributing to the level of participation. Both models show good fit.
Khushk and Smith (1996)	Describe the structure and operation of the mango marketing channels, and quantify marketing margins of producers and other market agencies in Pakistan	Stratified random sampling: strata defined in Sindh province, Pakistan. Randomly sampled 205 respondents (producers 120; contractors 20; commission agents 20; wholesalers 15; retailers 20; and exporters 10) Administered a structured questionnaire.	Marketing margin analysis. In order to measure market margins, data on mango prices were obtained at different stages in the marketing chain.

5.2.2. Data analysis techniques

Compared to the data collection strategies, the analytical techniques showed considerably more variation. However, the analysis of data matched the overarching purpose of the research. Randela *et al.* (2008), for example, modelled the probability of small-scale farmers' participation in agricultural output markets as a binary choice: either the farmer participates in the agricultural output market or not. In this case, a binary logistic regression model proved to a good econometric tool to isolate the determinants of market participation. Montshwe (2006) and Uchezuba (2009) adopted a similar approach, although they concentrated on small-scale livestock farmers. Whilst these studies stress the identification of determinants of market participation, they fail to show the full impact on the depth of market participation or its impact on sales volumes and farmer incomes. Yet all these goals or outcomes form the fundamental drivers or rationale behind why resource-poor small farmers might push to enter more profitable output markets. Simple binary choice decisions provide incomplete insights into such key concerns.

Makhura (2001), Jagwe *et al.* (2010) and Komarek (2010) modelled small-scale farmers' participation in markets as a two-step process. Step 1: small-scale farmers first decide to participate in the agricultural output markets. Step 2: they then decide on the level or volume of their sales in the markets. A popular but more complex approach exploited in this body of work is Heckman's two-stage procedure. It first estimates a probit model to determine the factors that affect the decision to sell in markets. In the second step, the Heckman approach estimates a

conventional OLS model to determine how much the significant independent variables in the model contribute to the level of participation.

5.3. Data collection procedures and process

In this section we provide a detailed description of the primary data collection strategies followed in this study. This study is based on a purpose-built survey, preceded by unstructured key informant and focus group interviews, conducted in two districts of Limpopo province, namely Mopani and Vhembe districts. These two districts combined produce about 75% of all mangoes sold in South African markets (NDA, 2008). In terms of other subtropical crops, the agricultural potential of these two areas is enormous. Avocados, macadamia nuts, litchis, guavas, bananas and vegetables are extensively produced in these two areas (Mopani District Municipality, 2009; Vhembe District Municipality, 2009). However, the bigger picture of this study goes beyond the agricultural potential of these areas: The importance of small-scale farmers' participation in agricultural output markets as a tool to alleviate poverty and hunger is at the core of this study.

5.3.1 Mopani and Vhembe districts

The study areas were carefully selected to encompass locations where the majority of the poor are found, that is rural areas. In the Mopani district about 84% of the population of 1 223 747 resides in rural areas and 77% of them live below the poverty line (Mopani District Municipality, 2009). About 37.8 % of adults over the age of twenty do not have formal schooling. Agriculture is the second most important source of employment in the Mopani district, with about 26% of the

employed people. It also contributes about 5% towards the district GGDP. The unemployment rate was about 40% in terms of the strict definition and 60% in terms of the broad definition from 2005 to 2007 (PROVIDE, 2009).

In the Vhembe district, the population is estimated at 1 388 427 (Vhembe District Municipality, 2009). About 81% of the population resides in rural areas, 14% in urban areas and 5% live on farms. It is estimated that about 57% of the Vhembe population did not attend formal schooling (Vhembe District Municipality, 2009). Over 63% of the population lived below the poverty line in 2008 (Vhembe District annual report, 2008). The main contributions to the economy of this district are public services (22%), mining (0.7%) and trade (14%). Agriculture's share of the district GGDP was estimated to be between 4% and 6% in 2008 (Vhembe District annual report, 2008). The unemployment rate was at 60%, based on the broad definition, and on the strict definition it was 30% between 2000 and 2007 (PROVIDE, 2009).

5.3.1 Focus groups and key informant interviews

In South Africa, political and economic factors complicate the precise definition and identification of smallholder farmers and their future prospects (Aliber & Hart, 2009; Kirsten & Van Zyl, 1998; Pauw, 2007). In their survey on this controversial debate, Kirsten and Van Zyl (1998) underscored some elements to define a smallholder farmer: whether small-farmers should be defined in terms of land size, net farm income and profitability, or the managerial capacity and acumen of the farmer. Suitable measures for each of these defining features might vary considerably, depending on agro-ecological determinants and the agricultural sub-sector (crop and livestock types). Reliance on multiple livelihood strategies, which is so common among

rural households, increases difficulties to locate smallholder farmers according to old stereotypes. Aliber and Hart (2009), among others, use official data to illustrate another dimension of this problem: the lack of accurate data to generate a coherent nationally representative profile of South Africa's smallholder farm sector. Their findings suggest that smallholders are concentrated in Vhembe and Mopani, but official surveys probably continue to undercount the numbers of smallholder farmers.

In this context, given the potential difficulties to locate a sufficiently large random sample of resource-poor small farmers, mixed purpose-built data gathering strategies might add more value and be more insightful. The approach adopted in this case was to sequence data collection in two steps: first, conduct key informant and focus group interviews and, second, administer a structured survey instrument. Key informant interviews and focus groups allow for informal and in-depth discussion about pertinent issues that face actors in production and marketing in agricultural commodity chains in Vhembe and Mopani.

The key informants included extension officers and senior managers in the Limpopo Department of Agriculture, smallholder farmers, farm workers, informal fruit and vegetable traders, community leaders (Indunas) and representatives from other agri-business establishments (managers of retail supermarkets, the Johannesburg Fresh Produce Market and packing houses). This approach appears to be common, even when researchers want to draw an efficient random probability sample. Randela (2005), for example, used extension officers and members of a cotton growers' association as key informants in a study of the integration of emerging cotton growers into the formal economy in Mpumalanga province. Jari and Fraser

(2009) also built a sampling frame with assistance from extension officers to investigate the technical and institutional determinants of farmers' participation in markets in the Eastern Cape.

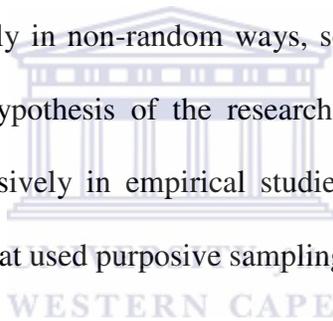
Triangulation is a common technique to strengthen the reliability of information gathered through qualitative interviews. Several focus group sessions with small farmers and farm workers assisted in this regard. A focus group, by definition, involves a guided or facilitated discussion of a manageable number of people during which a facilitator encourages group members to talk freely and spontaneously about a certain topic (Kitzinger, 1995). It usually precedes the administration of a questionnaire, but is also a useful survey verification method. In his study of transaction costs and market participation in the Northern Province of South Africa, Makhura (2001) used focus groups as a post-survey follow-up tool.

Marsland *et al.* (1998) argue that the use of informal data collection tools before administering structured questionnaires is an accepted and common practice. Such open-ended diagnostic studies help to formulate or refine hypotheses, which can then be tested rigorously by a structured questionnaire. Insights from qualitative information have proven to be invaluable in shaping the overall design of the quantitative phase, especially the structure and content of survey instruments (Homan, 1991).

5.3.2 Purposive survey

As outlined previously, in our research context a sampling technique was selected to best answer the research questions. Purposive sampling, which relies heavily on the referral technique, was found to be most appropriate. The main motivation behind using this technique was to ensure a sufficient number of respondents in the sample. Kerlinger (1986) described purposive sampling as non-probability sampling, which is characterised by the use of judgment and a deliberate effort to obtain representative samples by including typical areas or groups in the sample.

The main aim of using the purposive sampling technique is to focus and, where practical, minimise the sample size, generally in non-random ways, so as to select only those cases that might best clarify and test the hypothesis of the research (Kerlinger, 1986). The purposive sampling technique is used extensively in empirical studies. The literature reviewed for this study pointed out several studies that used purposive sampling to investigate similar problems.



The disadvantages of purposive sampling, in terms of statistical precision and generalisation, are generally recognised (Dolisca, McDaniel & Teeter, 2007). The most important criterion in the purposive sampling technique is to increase the validity of the collected data (Carmines & Zeller, 1979) as opposed to representativeness, which is the main criterion for most probability sampling techniques (Teddlie & Yu, 2007). The extent of sampling error could not be estimated using purposive sampling and thus bias might be present.

In this study, in order to include only those cases of interest, purposive sampling was chosen to maximise the availability of information-rich cases, i.e. small-scale mango farmers who already participated in agricultural output markets. Purposive sampling helped to choose the information-

rich cases needed to study the dynamics of small-scale mango marketing in a specific local context. The main concern is not based on being able to generalise the findings back to the population of small-scale (mango) farmers, but to tell a story about a specific problem within a specific local context.

A structured questionnaire was administered to purposefully selected respondents – relying extensively on the in-depth knowledge of extension officers to locate respondents. The survey questionnaire was designed to capture, among others, the following information that was important for this study: household demographic information, household asset ownership, marketing information, distance from nearest town, marketing channels used, quantities sold at various markets, prices at various markets, and the main way of delivering products to the buyers. The survey instrument was pre-tested through a small pilot in Vhembe and Mopani, which informed minor improvements to the final questionnaire.

In the light of the detailed nature of the questionnaire, the researchers found a face-to-face method of administering the questionnaire to the sampled respondents to be the most suitable. Alternative strategies to administer questionnaires, e.g. telephone, e-mails and respondent-administered mail-order surveys (Leedy & Ormrod, 2004; Montshwe, 2006) were considered to be inefficient in this research context. The farm household was our unit of data collection. Fieldworkers asked questions in the language of the respondent. Household representatives selected as respondents had to be adult decision makers with detailed information about the household income and expenditure, e.g. the household head, spouse, daughter or son (Makhura, 2001). This approach was applied flexibly to allow the respondents to consult with other

household members where necessary. A total of 235 households were interviewed, which serve as the sample size for this study.

5.4. Data analysis method and justification

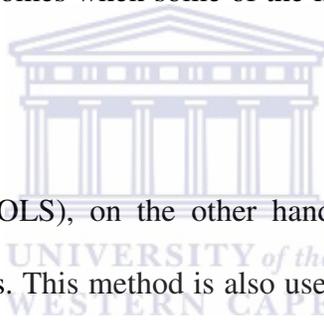
Small-scale farmers' participation in the markets can be defined in many ways (Montshwe, 2006). STATA Version 10 was used to analyse the data. For this study, participation in the markets is defined on the basis of the revenue that small-scale farmers derive from their participation in the markets. Small-scale farmers' participation in the markets was divided into two categories. If the farmers derive more than 50% of their total mango revenue from their participation in formal markets (agro-processing firms, supermarkets, etc. – more formal arrangements), then they were coded as 1, thus symbolising participation in the formal markets, while they were coded 0 if they participated in informal markets (informal traders, farm-gate selling, consumers in the community, etc. – more informal arrangements). Therefore the dependent variable is clearly categorical in nature and takes a Bernoulli or binary variable (Gujarati, 2006). The main objective of this study was to estimate the odds of small-scale mango farmers' participation in agro-food markets under transaction cost variables.

Therefore, this study uses a logit model to analyse the effects that selected transaction cost variables have on small-scale farmers' participation in the formal and informal markets. The logit model is utilised to estimate the outcomes for binary dependent variables and uses odds ratios for studies that entail binary outcomes (Bekele, 2008; Montshwe, 2006). Logit and probit regression procedures are theoretically the same and are used at length to explain the non-linear association between dichotomous dependent variables. In the logistic regression, the econometric

appraisals of effect are the odds ratios. This estimate is readily available in the logit regression. Although probit regression offers estimates for the regression coefficient, it does not provide odds ratios directly (Bekele, 2008). Furthermore, probit models are useful when the outcome variable used reflects an underlying, quantitative variable and this method applies cumulative normal distribution (Bekele, 2008). The theory of normal probability distribution underpinning probit makes it unsuitable when dealing with a categorical outcome variable which is strictly qualitative (Montshwe, 2006). As a consequence, preference is given to the logit regression model in this study.

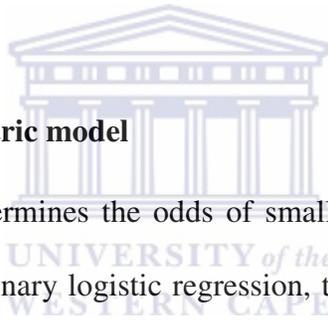
Logistic regression is a mathematical modelling approach that can be used to describe the relationship of several independent variables to a categorical variable (Gujarati, 2006). The logistic regression is a non-linear transformation of the linear regression. The logarithmic transformation in this model stabilises the variance if the standard deviation in the original scale varies from the mean. Instead of the t-statistic, the model uses chi-square to determine the overall model fit. In a binary logistic regression model, the dependent variable Y is predicted on the basis of independent variables $X_1 \dots X_k$. This technique enables us to identify the most influential predictor variables affecting small-scale farmers' participation in formal markets ($Y = 1$). The identification of the influential predictor is done on the basis of the odds ratio. An odds ratio of 1 indicates that the dependent variable X has no impact on the probability that $Y = 1$. An odds ratio greater than 1 indicates that an increase in X results in an increase in the likelihood of $Y = 1$. An odds ratio smaller than 1 indicates that an increase in X results in a decrease in the likelihood of $Y = 1$ (Bekele, 2008).

Other methods, such as discriminant functional analysis, are also useful for analysing the problem with the categorical dependent variable. The discriminant functional form $\sum L_i \delta_i$ is a linear function of X_i that gives the smallest probability of misclassification. The L_i are coefficients determined in order to satisfy this requirement. Since X_i follows multivariate normal distribution, it is known from the theory that $\sum L_i \delta_i$ is normally distributed. However, if any of the dependent variables are dichotomous or categorical in nature, then the discriminant function method tends to give biased results, usually giving estimated odds ratios that are too high. The weakness of discriminant analysis, which is why it could not be used for this study, is that it cannot be used to estimate the outcomes when some of the independent variables are categorical (Montshwe, 2006).



Ordinary least squares methods (OLS), on the other hand, have been widely used to solve problems with continuous variables. This method is also useful in cases of categorical variables; however, if constraints are not enforced on the independent variables, the predicted outcomes have a propensity to be larger than either of the restricting values of 0 and 1. The classical regression assumption of heteroscedasticity of the error term is also expected to be breached, especially if fractions in the overall sample are next to either 0 or 1 (Gujarati, 2006; Montshwe, 2006). If the Y value for any given individual must either be 0 or 1, and yet X may vary continuously, then the disturbance term cannot be normal and will of necessity be a function of X, contrary to the required assumption by OLS (Bekele, 2008; Montshwe, 1996). As such, OLS was not a useful approach for this study due to the infringement of the classical regression assumption.

Predictor variables included in the logistic regression model were selected using the Pearson chi-square (for categorical variables) and Spearman (for continuous variables) test of association. These tests were applied as a screening procedure to test the association between dependent and independent variables. These tests only take into consideration the effect of one independent variable to dependent variable and thus exclude the effects of other independent variables. As such, this single-effect type of approach is not desirable for studying the impact of various other variables. The shortcomings of both the Pearson chi-square and Spearman chi-square tests can be overcome by estimating an advanced logistic regression model that takes multiple variables into consideration.



5.5. Specification of the econometric model

The model used in this study determines the odds of small-scale farmers’ participation in the formal and informal markets. In binary logistic regression, the dependent variable is defined as follows:

- Y= 1 if farmers participate in the formal markets*
- 0 if farmer participates in informal markets*

Generally, the binary logistic regression model of a dichotomous outcome variable Y, on a combination of k discrete and continuous variables $X_1, \dots, X_2, \dots, X_k$, is defined by the following logit function:

$$\text{logit}(p_i) = \ln\left(\frac{p_i}{1 - p_i}\right) = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \dots + \hat{\beta}_k X_k \dots \dots \dots (1)$$

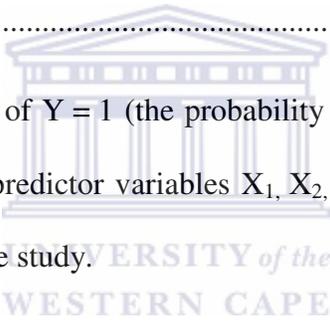
In this study, like in many others, X_i will contain both continuous and dichotomous variables. X_i is a set of independent variables (such as demographic characteristics, resource endowment (e.g. land size) and transaction costs variables (e.g. ownership of transport means)). The probability that small-scale mango farmer participates in the formal market is given by the following statistical expression:

$$\Pr (Y=1) = \frac{1}{1+\exp(-z)} \dots\dots\dots (2)$$

Where

$$Z = \hat{\beta}_0 + \hat{\beta}_1 + \dots\dots\dots + \hat{\beta}_k X_k \dots\dots\dots (3)$$

Using equation (3), the probability of $Y = 1$ (the probability that small-scale farmers participate in the formal markets), given the predictor variables $X_1, X_2, X_3, \dots, X_k$, can be worked out from randomly selected households in the study.



Interpretation of the odds ratio

The odds ratio corresponding to the i^{th} explanatory variable X_i is equal to $\exp(\hat{\beta}_i)$

Where $\hat{\beta}_i$ denotes the estimated regression coefficient X_i .

Case 1:

If $\hat{\beta} > 0$, the $\exp(\hat{\beta}) > 1$. In this case, the odds of $Y = 1$ are increased by a factor of $(\hat{\beta})$

Case 2:

If $(\hat{\beta}) < 0$, the $\exp(\hat{\beta}) < 0$. In this case, the odds of $Y = 1$ are decreased by a factor of $(\hat{\beta})$

Case 3:

If $(\hat{\beta}) = 0$, then $\exp(\hat{\beta}) = 1$. In this case, the odds of $Y = 1$ remained unchanged $(\hat{\beta})$

5.6. Conclusion

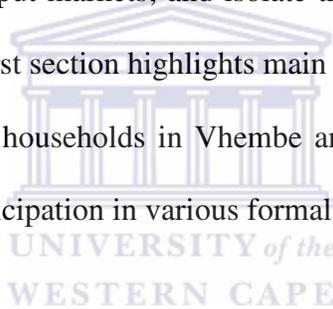
This chapter has outlined the research methods used in this study. Both qualitative and quantitative research methods have been discussed and each method served a specific purpose. The qualitative research methods, which included focus group discussions and key informant interviews, were used to map the study area and identify the small-scale farmers. They also served as a platform for informal, open-ended discussion sessions with farmers and other people who are familiar with the local setting. The quantitative research design was characterised by the administration of a structured questionnaire to purposefully selected respondents.

Spectrums of studies that investigate the problem of small-scale farmers' access to and participation in the markets have been reviewed. The pros and cons of these methods have been discussed to solidify our choice of research methods. The data analysis tool of this study has been outlined. The binary logistic regression model is used in this study because of its ability to determine the effect of variables on the probability of small-scale farmers' participation in the markets (Randela, 2008). Secondly, it yields the highest predictive accuracy possible with a given set of predictors and can be used with both continuous and categorical variables (Aldrich & Nelson, 1984; Bekele, 2008). The section that follows will discuss the results of this study

CHAPTER SIX: ANALYSIS AND RESULTS

6.1. Introduction

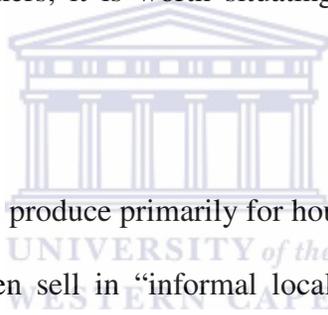
In this chapter we present and discuss the key findings from the primary information gathered through the qualitative and quantitative methods explained in the previous chapter. Through a systematic sequencing of these methods it was possible to collect an informative set of primary data to: identify small-scale mango farmers in the Vhembe and Mopani municipal districts and document the scope of their agricultural activities; examine the extent to which they participate in formal and informal mango output markets; and isolate the transaction costs that affect their output market participation. The first section highlights main insights from the key informant and focus group interviews with farm households in Vhembe and Mopani. It focuses on access to land, production activities and participation in various formal and informal markets.



The main objective of this chapter is to report the findings of this study. Two procedures are followed to report these findings. The first part of this section will focus on two points: the results of the informal interviews conducted in the initial phase of this study. We draw attention to three basic questions: firstly, who are the producers in these two areas? What agricultural output markets are available in both districts and what are the arrangements that exist between households and buyers in the different markets? The second part of this study also consists of two sections. Firstly, we will discuss the descriptive statistics of the data set. Various issues are discussed in this section, including household headship, household head gender, household composition, household food expenditure patterns, etc. The last section of this chapter reports the empirical findings, which will be followed by in-depth analysis of results.

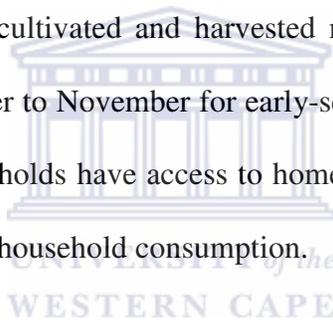
6.2. Insights from qualitative interviews: farm household and agro-food value chains

As mentioned in the background chapter on Limpopo, the cultivation, harvesting and marketing of subtropical fruits and fresh vegetables dominate agricultural activities in the main research sites. However, access to farmland is primarily through a household's permission to occupy (PTO) communal land, regulated by tribal authorities through PTO certificates, which do not transfer titled freehold ownership. Households with access to communal farmland further depend on apartheid-era irrigation schemes that range from 1 to 2 ha per household. Some households have freehold land and these private landholdings range from 1 to 124 hectares. While this study concentrates on small mango farmers, it is worth situating this evidence in the context of a broader range of farm activities.



Households that farm on PTO plots produce primarily for household consumption, but those who are able to produce surpluses often sell in “informal local markets”. A variety of cabbages, beetroot, spinach, butternut and maize are typical crops cultivated and harvested. In Vhembe, for instance, a focus group interview with 12 farm households in the Dzindi irrigation scheme revealed that all 105 households farming on the scheme have plots of 1,2 ha, and cultivate maize and multiple other crops, including local varieties of muxe. Households that had sold crops were asked to rank two or three crops from which they obtained the most income. Half of the households derived most of their income from growing and harvesting cabbage and Chinese cabbage. Roughly a third of the households ranked sweet potatoes and muxe as their top income earners.

Similar forms and types of crop production take place on old irrigation elsewhere in these districts, and on farmland transferred to land reform beneficiaries. A farmer in the Tshiombo irrigation scheme, for example, explained that although he cultivated vegetables crops on approximately 15 ha, he regularly rented additional land from other PTO certificate holders. In recent seasons, this farmer had been able to rent another 12 ha to produce vegetables for sale to supermarkets. This case suggests that a secured agro-food output market (through contract farming) has enabled investment in labour, other farm inputs and farmland – especially through an informal farmland rental market where communal tenure is the norm. In the Tshawulu irrigation scheme, each of the nine farm households had access to 10 ha of land with PTO tenure status on which they exclusively cultivated and harvested mangoes. In the mango production cycle, harvesting lasts from October to November for early-season mangoes, which go mainly to atchar factories. In addition, households have access to home gardens, with an average of about 0.5 ha on which to grow maize for household consumption.



The Shiyamanye Communal Property Association (CPA) obtained farmland through land restitution. Whilst the total size of the farm is about 1 030 ha, the informants said that they were cultivating 15 ha as a community garden, producing vegetables for household consumption. The Shibambo farm was acquired by a family through the Land Redistribution for Agricultural Development (LRAD) subsidy, the main state grant to deliver land to individuals able to make an ‘own contribution’. Although the total farm size is 124 ha, the farmer was practicing intensive organic farming on 1,8 ha for sale to the Johannesburg Fresh Produce Market and supermarkets (striving to be a fully certified supplier of organic vegetables to Woolworths and Pick n Pay). This farmer mainly produces organic vegetables such as cabbages, butternut and baby marrow.

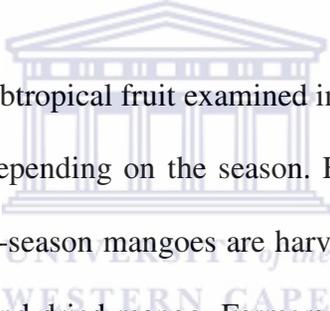
Informal traders at the roadside Tshakhuma market were also interviewed. Although not well developed, the Tshakhuma market hosts a variety of agro-foods, ranging from vegetables to fruits and nuts. Mangoes, bananas and naartjies are displayed prominently and make up a large share of the produce sold. Vegetables, in sharp contrast, comprise a much smaller share of sales and depend heavily on the season. Informal traders at the Tshakhuma market are predominantly females, each with access to a sale stand on which to display produce and a small storage space. Interestingly, these informal traders procure the bulk of their produce from commercial farms in the Levhubu Valley and only occasionally from small-scale farmers. In fact, the small-scale farmers are used as secondary sources of supply.

6.3. Households' linkages with the agricultural output markets

Some farm households in Vhembe and Mopani sell their agro-food outputs to supermarkets and fresh produce markets, while others are inclined to sell to the local traders and communities. In the case of Dzindi irrigation scheme, for instance, less than 25% of the farmers reported sales of cabbages and other fresh vegetable crops to the Spar supermarket in Thohoyandou in the 2007 season. The farmers said that they obtained slightly higher prices in the informal markets compared to what they receive from Spar, bearing in mind the seasonal fluctuation in prices. During the early part of the 2007 season, for example, hawkers or informal traders were prepared to pay R4 per bundle of spinach, whereas the local Spar supermarket paid only R3. Similar price differences were reported for cabbage. Farmers complained of their limited negotiating or bargaining power over prices with Spar. The Spar supermarket not only fixed the prices, but also

stipulated rigid delivery times. The lack of transportation acts as a major barrier to this arrangement.

Occasionally the farmers entered into contractual arrangements with buyers. Some farmers reported having contracts with Pick n Pay supermarkets and the Kruger National Park for supplying vegetables. These farmers sold mainly differentiated agro-foods, such as organic vegetables that required certified compliance with global standards, such as the EuroGAP certificate. Sales to the Johannesburg Fresh Produce Market occurred through market agents, often through pack houses.



Turning to mangoes, the delicate subtropical fruit examined in this study, it is worth noting that it is sold through various markets, depending on the season. Early season mangoes are typically sold to atchar factories, while peak-season mangoes are harvested for fruit sales and late-season mangoes go to factories for juice and dried mango. Farmers in the Tshawulu irrigation scheme, for example, reported contractual bonds with the Big Six atchar manufacturer in Mussina. Agro-processors set standards and rules (e.g. pesticides and fertiliser usage) that small-scale farmers must adhere to, and failure to comply usually results in contract termination.

In 2007 and 2008, the early season price of mangoes ranged from R700 to R1000/ton, while late season mangoes could fetch up to R1 500/ton in the juice and dried mango markets. Small-scale farmers complained about a lack of bargaining power over price determination when transacting with the agro-processors. The agro-processors fix prices for the farmers, but exclude distance and transportation costs incurred to deliver mangoes to the buyers.

Small farmers appear to be selling irregular and insignificant volumes of harvested mangoes to informal traders. As mentioned earlier, it emerged from the interviews with the informal traders that they purchased produce (including mangoes) mainly from large-scale commercial farmers, rather than from resource-poor small farmers. From the viewpoint of mango growers, informal traders thus form an inconsistent group of buyers for this delicate and perishable crop. Moreover, to avoid crop losses that often face peak-season mangoes, primarily due to theft, small mango farmers reportedly sold almost half of their harvest to atchar factories early in the season. The atchar market thus forms a large and secure income source for small producers. The Lungane citrus irrigation scheme and other individual small growers in these districts follow similar production and marketing strategies. Table 6.1 provides a summary of the agricultural production and market strategies of the projects that were visited to gather preliminary qualitative evidence about the study site.

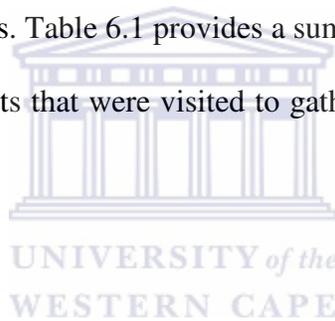


Table 6.1: List of projects and individual farming household visited in the Vhembe and Mopani districts

Farm	Land	Land used	Products	Output	Distribution/market
Former Telkom worker on communal irrigation scheme	PTO cert. 1-2 ha	1 ha	Cabbage, tomato, maize	Approx. 10 crates per day (mainly tomatoes)	Community traders (hawkers), commuters, not selling to supermarket or big tomato-processing plant
Tshiombo irrigation scheme	15 ha + planning to rent add. 12 ha	10 ha	Cabbage, sweet potato, butternut, 10 ha tomato, chilli peppers	Example: 9 000 head of cabbage every 3rd week	Supermarkets (Spar), JFPM (via agent), schools and hospitals
Shibambu farm (2003 with 18 org. farmers - Tzaneen)	124 ha	1,8 ha + 2 ha to be cleared (CASP)	Organic farming – cabbage, butternut, baby marrow; poultry limited	In-season, three ‘bakkie-loads’ per week	PnP contract; Kruger National Park; GAP certified; JFPM

Farm	Land	Land used	Products	Output	Distribution/market
State land in communal area – single businessman	21 ha	10 ha	Mainly macadamia	Zero; trees still maturing	None
Shimange CPA	1 030 ha	15 ha 45 ha (comm. garden)	Macadamia; fresh vegetable crops (spinach, cabbage, beetroot); 19 cattle	For subsistence +20 bundles of spinach, beetroot per week	Supermarket (Spar); community (contact through teacher...); taxi rank
Tshakhuma roadside market (female traders/ co-op)	Some rent access to home garden	Less than 0.5 ha; zero production for sale	Banana, avocados, naartjie; mango, macadamia nuts, tomatoes	Buy from large commercial farmers and ‘village farmers’	Commuters; good sales during December holiday season
Dzini irrigation scheme	1-2 ha per household	1-2 ha per household	Vegetables and maize	Vegetables and maize	
Tshawulu irrigation scheme	90 ha	Each household has access to 10 ha	Mangoes	20-50 tons/farmer in the past season (2007-2008)	Atchar, juice, informal traders

6.4. Household demographic information.

This section introduces a descriptive overview of the demographic characteristics, asset access and agricultural activities of the 235 rural households included in the purposive survey – 100 being from Mopani and the other 135 in Vhembe. The survey respondents were asked to describe and classify the primary livelihood activity of the household head, which was then used as the occupation category. Table 6.2 presents an overview of the self-reported/identified occupations of the female and male household heads in Mopani and Vhembe. There are clear gender differences across the different occupations. Males are more likely to be farmers, whereas females are more likely to be informal traders and farm workers. While there is evidence of the feminisation of the agricultural labour force, there is clear evidence of gender-based inequities in primary agriculture/farming.

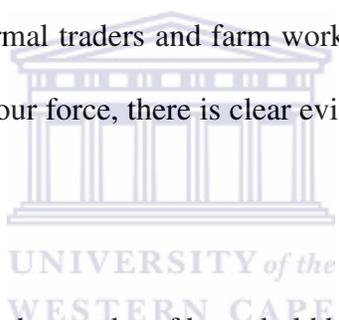


Table 6.2: Self-reported occupation by gender of household head in Mopani and Vhembe

	Mopani district		Vhembe district		Total
	Female	Male	Female	Male	
Farmers	10	29	17	25	81
Farm workers	27	22	36	29	114
Informal traders	12	0	22	6	40
Total	49	51	75	60	235

In an effort to build a demographic profile of the household, the questionnaire asked respondents about the individual members resident in the household in the past year (period of twelve months from 2007 to 2008). Average household sizes and the child-adult composition appear not to differ substantially between the two municipal districts, and neither does the main occupation of the household head. Households averaged five members, including caring for two or three

children. The average age of the household heads in both Mopani and Vhembe was almost the same – 51 years in Mopani and 52 years in Vhembe. This closely matches what Makhura (2001) found (57 years) almost a decade earlier among farmers in the same region.

Table 6.3 reports the highest level of education attained by the household heads, classified according to main occupation and district. The questionnaire specified four categories of education: primary/ABET, secondary, tertiary and no schooling. In both Mopani and Vhembe, the overwhelming majority of household heads had either primary or secondary schooling. Of the 80 farmers across the two districts, slightly more than 75% reportedly had obtained primary and secondary education. In the case of the farm workers the figure came to 86 out of 105 household heads, compared to 37 out of 40 household heads in informal trade. It is interesting to note although only 16 heads of households had attained tertiary education; three out of every four heads with this level of education classified themselves as farmers. The striking picture emerging from these results is the fairly low levels of illiteracy among rural households in this sample, even though there is evidence of inequality in terms of school attainment across the rural categories.

Table 6.3: Highest level of education for household heads by district and main occupation

		Primary/ABET	Secondary	Tertiary	None	Total
Mopani	Informal traders	1	11	0	0	12
	Farm workers	14	19	0	13	46
	Farmers	14	18	5	2	39
Vhembe	Informal traders	10	15	0	3	28
	Farm workers	14	39	3	3	59
	Farmers	12	18	8	3	41
Total		65	120	16	24	225

6.4.1. Household ownership of movable and immovable assets

Household land ownership varies with occupation type. On average, farming household have access to 23 ha, farm workers to 0.74, while informal traders own 0.075 ha. Out of 235 sampled household, 223 reported access to brick house, which leaves 12 households that live in shacks. Ownership of storage facilities also varies dramatically across occupation type. About 48 farming households reported access to storage facilities, while seven farm workers and only two informal traders reported access to these facilities. Most farming households also had access to a tractor and vehicles such as a sedan or bakkie. There was inequality in terms of the ownership of movable assets among the sampled households, which indicates that farmers are more likely to have access to productive resources (land) and dwelling than other rural categories.

Table 6.4: Household head ownership of movable and immovable assets (average and count)

	Farmer	Farm worker	Informal trader
Land (ha)	23	0.74	0.075
Brick house (n)	80	108	37
Storage facilities (n)	48	7	2
Tractor (n)	37	2	2
Sedan (n)	26	4	3
Bakkie (n)	53	4	2

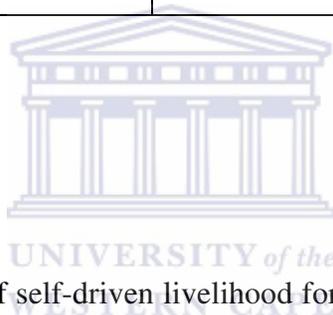
6.4.2. Financial assets

The household financial portfolio comprises various sources, such as personal income, government social grants, savings, remittances and savings. Table 6.5 below reports the various sources of income listed by the households. It is shown that the household head's income dominates the household's financial assets for all rural categories identified. This is followed by government grants, and then remittances and Rotating Savings and Credit Associations

(ROSCAS). Although savings contribute even more than grants, remittances and ROSCAS, it should be recognised that savings accumulate over time and thus cannot be compared to monthly cash transfers to the household.

Table 6.5: Average monetary value of financial assets per household by occupation (*monthly averages*)

	Farmer	Farm worker	Informal trading
Income (R)	R11 104	R1 150	R1 901
Social grants (R)	R2 022	R757	R708
Savings (R)	R14 538	R1 273	R1 650
ROSCAS and remittances (R)	R585	R538	R941



6.4.3. Livestock assets

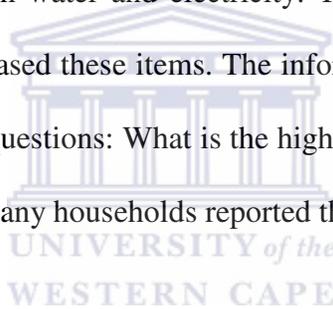
Livestock is an important source of self-driven livelihood for most rural households (Ngqangeni & Delgado, 2002). The livestock portfolio of the households consisted of cattle, goats, sheep, poultry and pigs. Table 6.9 shows the average stock count per category. Almost every household owned some kind of livestock. Farming households owned most of the cattle, goats, sheep, pigs, and poultry, followed by informal traders and farm worker households. Poultry is the major livestock owned by all households, followed by pigs for farmers, cattle for farm workers and goats, sheep and pigs for informal traders. The overall picture is that there is greater inequality with regard to livestock asset ownership among these three categories. Farmers are most likely to have access to livestock with greater value, such as cattle, than informal traders and farm workers.

Table 6.6: Household ownership of livestock by district and occupation (average stock count)

	Farmer	Farm worker	Informal trader
Cattle	12	6	2
Goats	10	5	4
Sheep	7	5	4
Pigs	18	3	4
Poultry	27	9	9

6.5. Household food expenditure patterns

The following few paragraphs will discuss household expenditure on items classified in the following categories: expenditure on bulk groceries, expenditure on food, expenditure on fruit and vegetables, and expenditure on water and electricity. The discussion put emphasis on the place where the respondents purchased these items. The information in the table below has been summarised to capture only three questions: What is the highest average expenditure? Where did the expenditure take place? How many households reported this?



From the table it can be seen that over half of the sampled households spent on average R542 on bulk groceries at supermarkets. Those households that did not purchase bulk groceries, but frequently purchased food spent an average of R422 at supermarkets. Households also spent an average of about R108 on fruit and vegetables, and this occurred at supermarkets. The picture emanating from this is that supermarkets are the most important point of purchase for food and other items among rural dwellers. The proliferation of supermarkets in Africa and other developing parts of the world has been discussed and the evidence that has emerged is that the majority of households are purchasing their food from this outlet. This is also evident in this study.

Table 6.7: Monetary value (nominal Rand) and main outlet of expenditure on household items by district and occupation (mean Rand value)

	Average	Point of purchase	N
Bulk grocery	R542	Supermarkets	137
Foodstuff (not in bulk)	R422	Supermarkets	98
Fruit and vegetables	R108	Supermarkets	51
Water and energy	R261	Municipality and other	11

6.6. Household farming activities

The sampled households produced a mix of agricultural commodities, including vegetables and fruit for own consumption (subsistence). Vegetables such as cabbages, beetroot, pumpkin, spinach and butternuts form part of the household cash crop production basket. Farmers also grow local varieties such as muxe and Chinese spinach, mainly for household consumption, but also for sale at the local level. Households also have orchards for mangoes and other subtropical commodities such as litchi, banana and macadamia nuts.

6.6.1. Household agricultural marketing activities

The table below shows households' participation in the markets. As expected, households that identified themselves as farming households participated in formal markets more than the other households. Farm workers also participated in the formal markets, but to a limited extent, while informal traders did not participate in the formal markets at all. On the other hand, farm workers participated more in informal markets, followed by informal traders and farmers. There is a highly skewed distribution of households' participation in the rewarding markets (formal markets) that favour the farmers, while the other categories participated mostly in the informal markets.

Table 6.8: Total number of households participating in the markets

	Farmer	Farm worker	Informal traders
Formal markets	52	2	0
Informal markets	29	112	40

Household were asked to provide information related to factors influencing their pricing decisions, who set the price when interacting with different buyers in the markets, and how they delivered the sold commodities to the respective buyers. Table 6.9 shows an extract from the questionnaire which captures the variation in terms of how different factors affect household pricing policy. This response represents the households' perspectives on pricing, not only for mango, but for a broader range of commodities they produce. About 27% of the households reported that they determined the price of a commodity before they sold it, while an overwhelming 73% indicated that they did not determine the price of a commodity before they sold it. The factors that influence household pricing decisions include the following: production input costs, national market prices, local market prices, distance from the market, the number of buyers who want the commodity, the buyer's profile and other exogenous factors.

The overwhelming majority of households (79%) did not identify production input costs as an important variable that influenced their pricing decision, while only 21% indicated that production costs were important to their pricing decision. National market price information influences how households determine their own selling price, with over 50% of the households indicated this to be the case. Local market prices are also important in price determination, but this might only be limited to cases where farmers are selling to the local traders and consumers in the community.

Distance from the market is not an important factor that influences the household's pricing decision. About 86% of the households indicated that distance from the market was not an important factor that determined their pricing decision. The number of buyers who want the commodity influenced the household's pricing decision. About 63% of the households indicated that they considered the number of buyers when they set the price. The majority of the households, about 47%, indicated that other exogenous factors such as risks, shocks, drought, etc. influenced their pricing decisions, while 29% indicated that this was not an important factor and 24% indicated that it was a very important element of the pricing decision.

Table 6.9: Share (%) of households that indicated the importance of different factors when determining selling price.

	Input costs	Price at national markets	Local price	Distance to the market	Number of buyers	Buyer's profile	Other risk or shocks
Highly important	0%	0%	0%	0%	0%	0%	24%
Important	21%	57%	72%	14%	63%	4%	47%
Not very important	79%	43%	28%	86%	37%	96%	29%

Power relations along the agro-food value chain are an important factor that determines households' incomes from their participation in the agro-food markets. The question of price and who sets it when transacting with different buyers produced expected results. The majority of the households (76%) indicated that they set the price when selling to informal traders or hawkers. On the other hand, none of the households indicated that the informal traders set the price, while 24% of the households indicated that they negotiated the price with informal traders. This

suggest that households have more power over how prices are set when interacting with informal traders.

When selling to the supermarkets, the majority of the households are price takers. About 60% of the households indicated that the supermarkets set the price at which they purchased commodities from the farmers, while 21% of the households indicated that they set their own price when selling to the supermarkets. Only 16% indicated that they negotiated the selling price.

An overwhelming majority of 84% of the households indicated that agro-processing companies set the price, 6% indicated that they set the selling price, while 10% indicated that the selling price was negotiated between them and the agro-processing companies. About 73% of the households indicated that they set their own selling price when interacting with consumers in the community, while 27% indicated that the price was negotiated. All the households indicated that they were the price takers when selling to the national fresh produce markets.

We can deduce two things from this information: firstly, households have more power to determine prices when interacting with buyers in the informal markets (i.e. informal traders and consumers in the community), while they are price takers when selling to formal markets. Secondly, some households are able to determine or even negotiate selling prices to formal markets, and this may indicate that these households are already integrated into the markets, while the majority are new entrants.

Table 6.10: Share (%) of farming households that indicated who sets the price when transacting with buyers.

	Informal traders	Supermarkets	Agro-processing	Consumers in the community	National fresh produce markets
Seller sets the price	76%	21%	6%	73%	0%
Buyer sets the price	0%	63%	84%	0%	100%
Negotiated price	24%	16%	10%	27%	0%

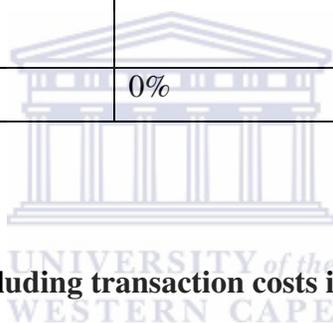
The most interesting statistics are presented in Table 6.11. The main way of delivering commodities to the buyers varies considerably between buyers. About 86% of the households indicated that informal traders collect the commodities from the farm gate, while only 14% delivered sold commodities to informal traders. This implies that the majority of the households do not incur opportunity costs and transportation costs of delivering commodities to the informal traders. When selling to the consumers in the community, the majority of households also did not incur transportation costs, because the buyers collect their commodities at the farm gate. About 79% of the households indicated that consumers in the community collect their purchases from the farm gate, while 21% indicated that they delivered to the buyers.

When selling to formal markets, the households incur costs associated with delivering sold products. About 62% of the households indicated that they delivered sold commodities to agro-processing factories, against 38% who indicated that the agro-processing companies collect commodities from the farm gate. On the other hand, all the households indicated that they incurred costs related to delivering commodities to the national fresh produce markets. The insight we can draw from this analysis is that the households' participation in formal markets is

characterised by costs associated with delivery and other opportunity costs, while the majority of the households in the informal markets do not incur costs when interacting with buyers.

Table 6.11: Share of farming households (%) that indicated the main way of delivering sold products to different buyers.

	Informal traders	Super-markets	Agro-processing firms	Consumers in communities	National fresh produce market
Off farm at seller's expense	14%	83%	62%	21%	100%
Farm gate at buyer's expense	86%	17%	38%	79%	0%
Other	0%	0%	0%	0%	0%



6.6. Econometric framework, including transaction costs in formal and informal output markets

This section reports on and explains estimates from the binary logistic model to analyse the survey data. Before presenting and discussing the key findings of our model, we begin with a description of bivariate statistics to test the independence of the binary dependent and various explanatory variables. Variables included in the logistic regression analysis were selected on the basis of the two tests conducted –the Pearson χ^2 test and the Spearman test.

The model includes four categories of variables: household demographic characteristics (gender and age), household asset ownership (household head income, ownership of bakkie, ownership of storage facilities, size of arable land, and monetary value of cattle), access to information

(proxied on proximity to nearest town) and collective action (participation in farmers' associations). An interactive variable was also included to determine the interaction between distance to and location of the nearest town. The following section will discuss these categories of variables and how are they relevant to this study.

Test of association between dependent and independent variable

The results of the test for the association between the dependent variable (household participation in the formal and informal markets) and explanatory variables are given in Table 6.12. Firstly, the Pearson chi-square (χ^2) test was conducted on the categorical variables and the Spearman chi-square (χ^2) test was conducted for the continuous variables. The main purpose of these tests was to identify if there was a significant relationship between the dependent variable and the independent variables. All the variables included showed a significant relationship, at the 5% level of significance. These variables were then used in the logistic regression.

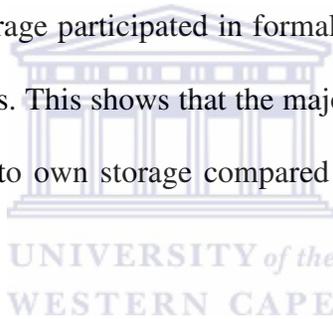
Addressing gender biases in agricultural production and marketing could contribute significantly to improved incomes for many women-headed households that participate in the horticultural output markets (Makhura, 2001; Pingali *et al.*, 2005). This variable assumes 0 if female and 1 if male. The majority of the households participating in the formal markets were headed by males. About 32.4% of male-headed households participated in formal markets compared to about 14.53% of female-headed households. On the other hand, only about 67.6% of male-headed households participated in the informal markets, compared to 85.48% of female-headed households. Therefore we can deduce that male-headed households participate mostly in formal markets, while female-headed households participate in informal markets.

The variable of proximity to the nearest town (ProximMrkt) was used to capture the actual distance between point of production and the market place. This variable also had a significant relationship with the dependent variable. Makhura (2001) highlighted that the location of a farmer with respect to the potential market is an important factor influencing successful participation in the markets. This variable assumes 1 if the actual distance to the nearest town is between 0 and 25 km, 2 if between 26 and 50 km, and 3 if more than 50 km. About 18.57% of the households staying within a radius of 0 to 25 km participate in the formal markets compared to about 81.43 % that participate in the informal markets. About 42.55% of the households farming between 26 and 50 km from the nearest town participate in formal markets, compared to 57.45% that participate in the informal markets. Lastly, 17.8% of households farming more than 50 km away are participating in the formal markets, compared to 82.50% that participate in the informal markets. This information reveals that the households that are far from towns participate in informal markets, while those that are closer to the town participate more in formal markets.

The other construct of transaction costs is access to assets. Household asset ownership is also a very important factor influencing farmers' participation in the markets by lowering transaction costs. For example, household ownership of transportation means, a bakkie (ownbakkie) in this study, enables farmers to reach markets that are far. Farmers do not incur direct costs related to transportation per se. This variable assumes 1 when farmers have access to their own transport and 0 if they do not have their own transport. About 64.41% of the households that have access to their own bakkie participate in the formal markets, compared to 35.59% who participate in the informal markets. On the other hand, about 9.09% of households that reported no access to a

bakkie participated in the formal markets compared to 90.91% who participated in the informal markets. This analysis shows that households owning a bakkie, which is a means of transport, participated more in the formal markets, while those that did not have access to a bakkie participated less in the formal markets.

Storage is also a significant factor influencing household participation in the markets. This variable assumes 1 if the household owns a storage facility and 0 if it does not. About 61.40% of the households that reported access to own storage participate in the formal markets compared to 38.60 % of households that participate in the informal markets. About 10.67% of the households that reported no access to own storage participated in formal markets, compared to 89.33% that participated in the informal markets. This shows that the majority of households that participated in the formal markets had access to own storage compared to those who did not have storage facilities.



The household income portfolio, which comprises of household income (HHIncome) and pensions (Pnsn), also plays a significant role in the farmers' participation in the markets. These variables were measured in terms of the mean values. According to Makhura (2001), household financial assets improve participation in the markets if the household heads decide to invest those assets in paving a way for market participation. For example, household income or pension can be used for hiring transport or purchasing information facilities, e.g. cell phones. On average, households heads who participated in the formal markets earned about R14 100, compared to R1 960 earned by households participating in the informal markets. On the other hand,

households that participate in the formal markets had higher pensions, on average about R586, compared to those participating in the informal markets, with an average of R203.

Similarly, the greater the livestock value (valcattle) owned by the individual, the more the propensity to sell in the markets. Households participating in the formal markets had a higher cattle value, of about R30 000, than those participating in the informal markets, with only R1 960. This indicates that households participating in the formal markets have larger herds of cattle than those participating in the informal markets.

The size of arable land (Lsize) influences participation in the markets, since having access to bigger land size increases the probability of higher production and thus market participation. The size of arable land was captured in hectares (ha). Households participating in the formal markets had 29 ha of land on average, compared to 2 ha owned by households participating in the informal markets. Financial assets (pension and household head income), value of cattle and size of arable land are all continuous variables.

Household head age is also a factor influencing participation in the markets. According to Pingali *et al.* (2005), age is an indicator of farming experience, which makes costs related to information easier to overcome and, as such, improves or increases farmers' participation in the output markets. Furthermore, Makhura (2001) indicated that older farmers are likely to have stronger social networks and will establish credibility within the network. Thus the hypothesis is that, as farmers grow older, they are more likely to overcome the costs related to searching for information, and thus their participation in the markets will also improve. This variable is

continuous and thus measured in years. The household heads participating in the formal markets were older than those participating in the informal markets.

One interaction variable was used for this study. This variable measured interaction between distance to the nearest town and the nearest town (interacttown). Being close to the market does not necessarily mean that you are likely to sell in the markets. This is evident in that you can be closer to the town, but if there is no place of effective demand in that town or the road conditions are not good, farmers will be less likely to participate in the market even though they are closer to the town. The farmer can be very far from the town as well and have a good quality road, but because of the distance they are likely to incur higher costs.



Table 6.12: Test for independence of association between dependent and independent variables.

Pearson χ^2			
Variable	Formal market	Informal market	p value
<i>Gender</i>			0.001
1 if Male	32.4%	67.6%	
0 if Female	14.52%	85.48%	
<i>Nearest town</i>			0.000
1 if Thohoyandou	44.3%	55.7%	
2 if Musina	9.2%	90.8%	
3 if Tzaneen	11%	89%	
<i>Proximity to town</i>			0.002
0 – 25 km	18.57%	81.43%	
26 – 50 km	42.55%	57.45%	
> 50 km	17.80%	82.50%	
<i>Own bakkie</i>			0.000
1 if Yes	64.41%	35.59%	
0 if No	9.09%	90.91%	
<i>Own storage</i>			0.000
1 if Yes	61.40%	38.60%	
0 if No	10.67%	89.33%	
<i>Dummy</i>			0.000
1 if Farmer	64.20%	38.80%	
0 if Non-farmer	1.30%	98.70%	
<i>Interaction of town and distance</i>			0.000
Spearman χ^2 test			
	<i>Mean values</i>	<i>Mean values</i>	
Household income (R)	R 14 100	R1 906	0.0000
Pension (R)	R586	R203	0.0002
Household age (Years)	52	44	0.0000
Arable land size (ha)	29	2	0.0000
Value of cattle (R)	R30 000	R1 960	0.0000

6.7. Results of binary logistic regression

The results of the logistic regression model are presented in Table 6.13. A total of 234 observations were analysed and both the log-likelihood ratio test (p-value for the $\chi^2 = 0.0000$) and pseudo-R² indicate that the data fit the model well. The results conform to a priori expectation and to the results obtained elsewhere (*see* Makhura 2001). Results of this model are discussed under the following subheadings.

Gender of household head (Gndr)

Gender of household head has a positive impact on small-scale farmer's participation in the markets. The odds ratio of gender is 1.72, which indicates that males are almost twice more likely to participate in the formal markets compared to their female counterparts. The unequal power relations in rural society make it difficult or impossible for females to establish and extend their networks because traditional rules and norms are prohibitive.

Age of household head (HHHAge)

Age is also a significant variable that influences participation in the formal markets. The odds ratio of age is 1.01, which is greater than 1. This suggests that, as farmers grow older, they are more likely to participate in the formal markets. This result reinforces the descriptive statistics results, which revealed that households participating in the formal markets are on average older than those participating in the informal markets. As outlined previously, age is an indicator of experience, and older household heads have accumulated experience with regard to exchange

relationships in markets and thus are more likely to sell in the formal markets than younger heads.

Household income (HHHIncome)

There is no change with regard to participation in the formal markets as income of the household head increases. The odds ratio of 1.00 for household income suggests that the household heads do not invest their income in activities related to farming; maybe they use it for household consumption. This implies that the household head's income does not determine whether a household participates in the formal markets or not. An increase in the income of the household head cannot does the likelihood of participation in the formal markets.



Pension (Pnsn)

The odds of participating in the market when a household earns a pension are less than 1. The odds ratio of 0.99 indicates that, regardless of an increase in pension, there would not be any effect on the farmer's participation in the formal markets. Farmers do not appear to invest pension incomes to access formal mango markets.

Ownership of bakkie (ownbakkie)

The odds of participation in the formal markets when farmers own their own bakkie is higher. The odds ratio of 1.76 indicates that farmers who own a bakkie are almost twice more likely to

participate in the formal markets than those who do not have a bakkie. This result also confirms the earlier descriptive statistics results, which indicated that the majority of households participating in the formal markets have access to own transport. Own transport is very important for a household's participation in the market, as it reduces the transaction costs related to transportation. Farmers who own transportation means are also able to deliver their mangoes on consistent bases and time. Consistent and timely deliveries are some of the most important factors that buyers in formal markets are interested in.

Ownership of storage facilities (ownsto)

Storage facilities also improve small-scale farmers' participation in the markets. The odds of participating in the formal markets when farmers have their own storage facilities are 1.35. This indicates that farmers owning storage facilities are more likely to participate in the formal markets than their counterparts who do not have storage facilities. Storage of mangoes is very important to retain quality of mangoes and therefore able to sell to formal markets where product quality is very important. Ownership of storage facilities thus reduces the transaction costs related to product quality, especially due to the perishable nature of mangoes. Again, this result confirms the descriptive statistics, which indicated that the majority of household participating in the formal markets has access to own storage.

Size of arable land (Lsize)

Participation in the markets is also influenced by the amount of arable land that farmers own. The odds ratio of size of arable land is greater than 1, although not that big. This suggests that, as the size of the arable land increases, the likelihood of farmers' participation in the market also increases. This result indicates that there is a positive relationship between the size of the arable land and participation in the formal markets. However, there is insufficient evidence to suggest that there is a significant relationship between the productivity of arable land and participation in the markets.



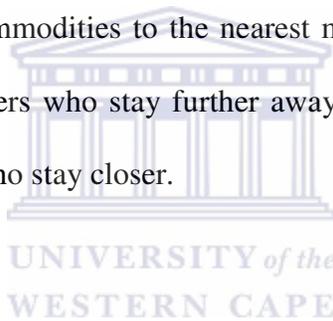
Value of cattle (valcattle)

The value of the cattle owned by farmers does not influence their participation in the formal markets. The odds ratio of 1 indicates that, as the value of the cattle increases, the likelihood for participation in the markets does not change. These results suggest that farmers do not sell their cattle to help mitigate problems related to market participation, especially in the formal markets. The value of their livestock might be higher than the expected returns from formal market participation and thus they hold on to their livestock.

Distance to the nearest town (ProximMrkt)

The reference distance for the nearest towns is a category of between 0 and 25 km. The odds ratio for farmers staying between 26 and 50 km is 0.21 which is less than 1. This suggests that,

relative to those farmers who stay in the reference category, farmers who stay between 26 and 50 km away from the town are less likely to participate in the markets. The odds of farmers staying more than 50 km is 0.14, which is even lower. These figures also indicate that, relative to the reference category, farmers who stay more than 50 km away from the nearest town are less likely to participate in the formal markets. The insight we can draw from this is that the further the farmers are away from the market, the more difficult it becomes for farmers to access and sell in the formal markets due to higher transaction costs. This makes sense in that most formal markets, such as supermarkets and agro-processing facilities, are mostly located in towns and suburban areas. The farmers are inclined to sell to informal traders and other local consumers when they fail to deliver their commodities to the nearest market outlet at unprofitable prices. This might also suggest that farmers who stay further away from the markets might have less access to information than those who stay closer.



The nearest town (Town)

The reference town is Thohoyandou. The odds ratio of farmers who stated that Musina was their nearest town is 0.14, which is less than 1. This suggests that, relative to those farmers in Thohoyandou, the farmers in Musina are less likely to participate in the formal markets. Farmers who stated Tzaneen as their nearest town were even less likely to participate in the formal markets relative to farmers in Thohoyandou. These results suggest that distance to the nearest town alone is not the only determinant of farmers' participation in the markets; availability of buyers in that town is also very important. For example, there is a concentration of agro-processing companies in and around Thohoyandou. These agro-processors make juice, atchar,

dried mango and other processed mango commodities. But in Musina there are very few agro-processing market opportunities for mango producers. This means that, even in the case where farmers are closer to the towns but there is lack of buyers in that town, they are less likely to sell in the formal markets. However, in Tzaneen, where there also is a concentration of mango-processing factories, farmers are less likely to participate in the formal markets. These results suggest further that there might be differences with regard to agro-food market structures in Tzaneen, Thohoyandou and Musina. Farmers in Tzaneen might be faced with other barriers that we did not capture in this study, e.g. issues related to market power.

Interaction between nearest town and distance (interacttown)

This variable captures the interaction between distance and the town after realising that there is a variation with regard to the actual location of the farmer and the distance to the nearest town. The odds ratio of the interaction variable is 1.02, which is slightly above 1. This result indicates that there is a small change, an increase, with regard to the farmers' participation in the formal market as they move further away from the towns that they stated as their nearest town. However, we have established a variation with regard to the markets available at different towns. These results indicate that distance is still a significant factor influencing participation in the formal markets, regardless of whether households stated Thohoyandou, Musina or Tzaneen as their nearest town.

Membership of farmers' organisation (FarOrg)

Households that participated in the farmers' organisation were 223 times more likely to participate in the formal markets than those that do not participate. These results imply that social networks are very important in helping farmers access the markets by reducing the costs related to information and bargaining. Farmers' organizations/associations also facilitate sharing of resources, such as transportation means and thus reduces the costs associated with transportation and storage.



Table 6.13: Estimates of the binary logistic regression analysis

Participation in the formal markets = 1, informal markets = 0		
Variables	Odds ratios	95% confidence interval
<i>Household factors</i>		
Gndr		[0.47 ; 6.35]
Female (r)	1.00	
Male	1.73	
HHHAge	1.01	[0.94 ; 1.08]
<i>Household assets</i>		
HHHIncome	1.00	[0.99 ; 1.00]
Pnsn	0.99**	[0.99 ; 1.00]
ownbakkie	1.76	[0.48 ; 6.50]
ownsto	1.34	[0.37, 4.82]
Lsize	1.04	[1.01 ; 1.08]
valcattle	1.00**	[1.00 ; 1.01]
<i>Access to information</i>		
ProximMrkt (0 km – 25 km)(r)	1.00	
ProximMrkt (26 km – 50 km)	0.21	[0.03 ; 1.44]
ProximMrkt (0 km – 25 km) (r)	1.00	
ProximMrkt (>50 km)	0.18	[0.16 ; 2.02]
Town (Thohoyandou) (r)	1.00	
Town (Musina)	0.15**	[0.00 ; 0.91]
Town (Thohoyandou)(r)	1.00	
Town (Tzaneen)	0.02***	[0.00 ; 0.21]
<i>Interaction variable</i>		
interacttown	1.02	[1.01 ; 1.04]
<i>Social capital</i>		
FarOrg	223***	[15.77 ; 3164.39]
Model summary:		
Number of observations: 234		
LR Chi ² (11): 157.54		
Pseudo R ² : 68,9%		
Prob > Chi2: 0.0000		

r: reference category; significance level ,* 10%, ** 5%, *** 1%

6.7.1. Model specification test

The linktest is used to test whether the model is properly specified. After the logistic regression, linktest uses the linear predicted value ($\hat{\mu}$) and linear predicted value squared ($\hat{\mu}^2$) as the predictors to rebuild the model. If our model is properly specified, variable $\hat{\mu}^2$ should not have much predictive power, except by chance. Therefore, if $\hat{\mu}^2$ is significant, then the

linktest is significant. In our model, the variable `_hatsq` is significant (with p-value = 0.011). This confirms that we have chosen meaningful predictors.

Table 6.14: Results of the linktest for model specification

particstatus	Coefficient	Std error	Z	p> z	Confidence interval
<code>_hat</code>	0.975	0.160	6.08	0.000	0.661 - 1.289
<code>_hatsq</code>	-0.221	0.009	-2.54	0.011	-0.392 - -0.005
<code>_cons</code>	0.612	0.282	0.22	0.828	-0.4901- 0.6133

6.7.2. Multicollinearity test

Multicollinearity occurs when two or more independent variables in the model are approximately determined by a linear combination of other independent variables in the model. To test for multicollinearity in our model, we first ran the OLS regression and then computed the VIF values. Lower VIF values of less than 10 indicate the absence of multicollinearity in our model.

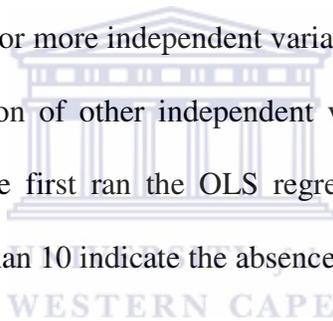


Table 6.15: Results for multicollinearity test, Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Valcattle	4.51	0.221
HHHIncome	4.41	0.227
Interacttown	3.45	0.290
FarOrg	2.78	0.359
proximMrkt	2.42	0.412
Ownbakkie	2.25	0.444
Ownsto	1.91	0.524
pnsn	1.84	0.543
Town	1.83	0.546
Lsize	1.54	0.649
HHHAge	1.31	0.762
Gndr	1.17	0.855
Mean VIF	2.45	

6.7.3. Influential variables

Pearson residuals are defined as the standardised difference between the observed frequency and the predicted frequency. They measure the relative deviations between the observed and fitted values. Deviance residual is another type of residual. It measures the disagreement between the maxima of the observed and the fitted log likelihood functions. Since logistic regression uses the maximal likelihood principle, the goal in logistic regression is to minimise the sum of the deviance residuals. Therefore, this residual is parallel to the raw residual in OLS regression, where the goal is to minimise the sum of squared residuals. Another statistic, sometimes called the hat diagonal since it technically is the diagonal of the hat matrix, measures the leverage of an observation. It is also sometimes called the Pregibon leverage.

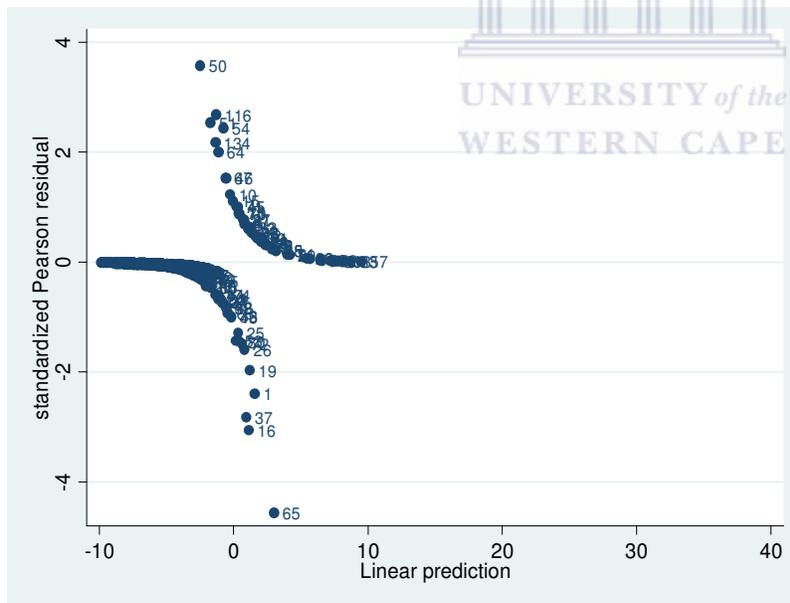


Figure 18: Plot of Pearson residuals

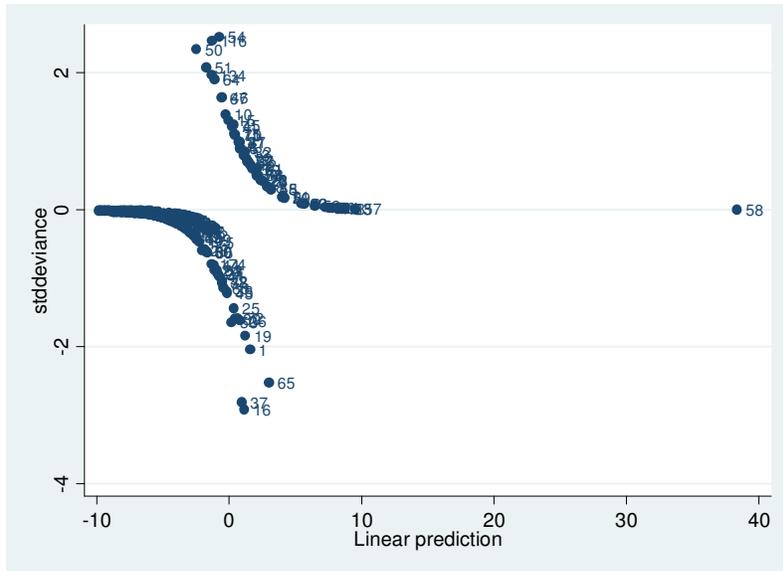


Figure 19: Plot of deviance residuals

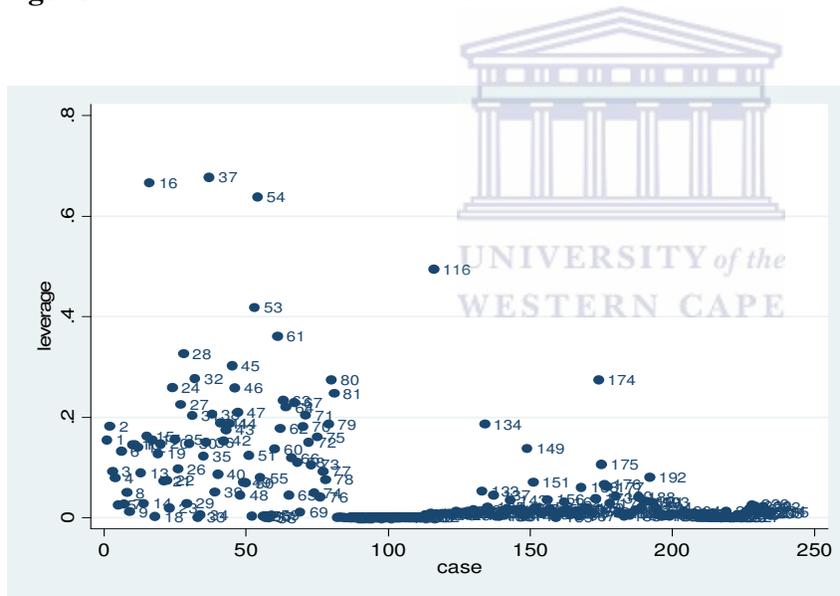


Figure 20: Plot of leverage residuals

These three statistics, the Pearson residual, deviance residual and Pregibon leverage, are considered to be the three basic building blocks for logistic regression diagnostics. They are always inspected first. A good way of looking at them is to graph them against either the predicted probabilities or simply case numbers. From the above plots we can see that some

observations are far away from most of the other observations. These are the points that need particular attention. For example, the observations numbered 50 and 65 have very high residuals, but their deviances and leverages are not that bad. This means that, by not including these particular observations, our logistic regression estimate will not be too much different from the model that includes these observations.

6.8. Conclusion

The first part of this chapter highlighted the findings of the qualitative interviews conducted at the initial phase to map the agricultural production and marketing in Mopani and Vhembe. Through descriptive statistics we have established that the majority of the households do not determine the price of a commodity before they sell it. Issues related to production input costs, distances to the nearest markets and profile of the buyer have been rated by the majority of households as unimportant factors when deciding on pricing. The households indicated that they did not determine the selling price when transacting with formal markets such as supermarkets, agro-processing factories and national fresh produce markets.

The logistic regression results indicated that the likelihood of participating in the formal markets increases with age. Those households owning storage facilities and a bakkie are more likely to participate in the formal markets. Ownership of these two assets reduces transaction costs in two ways: firstly, households owning a bakkie do not incur direct costs of transportation and thus are able to deliver the commodities to the market without a problem. This is a very important factor, especially in the formal markets, where timely and consistent delivery is an important aspect of participation.

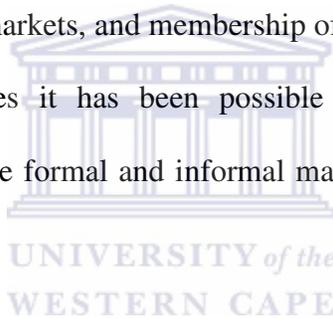
Secondly, ownership of storage facilities allows farmers to retain their product quality and adhere to standards set by the formal markets. This is also an important variable for participation in the formal markets. Distance to the nearest town also determines the household's participation in the formal markets. Those households that are further away from the markets are less likely to participate in the formal markets than those that are closer. This aspect can be linked to access to information, which is a very important aspect determining successful participation in the formal markets. Thirdly, belonging to a farmers' organisation increases the likelihood of farmers participating in the rewarding markets. Social networks are very important in reducing the costs related to information and bargaining, and sometimes reduce the transportation costs that farmers face.



CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

The objective of this study was to identify the nature of and extent to which transaction costs form a barrier to small-scale farmers' participation in output markets in an effort to lower such costs. The main hypothesis tested is that higher transaction costs in formal agro-food output markets reduce small-scale farmers' sales in and incomes from these markets. Although transaction costs are not observable, it is possible to track their effect on small farmers through proxies for the costs of market exchange: access to storage facilities, own versus hired transportation, distance to output markets, and membership of farmers' associations. With the aid of these transaction costs proxies it has been possible to estimate the impact of these determinants on participation in the formal and informal markets using a simple binary logistic econometric technique.



7.2. Who are the small-scale mango farmers in the Mopani and Vhembe districts?

To identify a household for inclusion in the sample, as in many purpose-built rural case studies, we relied on the rich local knowledge and referrals of agricultural extension officers. The survey questionnaire asked each respondent to classify the household's main way to earn a living. This self-identification approach yielded a range of generic and meaningful livelihood categories: small-scale farmers primarily engage in crop cultivation on small plots (backyard gardens), communal lands or private lands (especially land reform beneficiaries); farm workers rely predominantly on wage-earning opportunities in informal and fully-fledged commercial agriculture; informal traders sell agro-food outputs in informal roadside markets.

What emerged during conversations with the respondents was that, as a coping strategy, a household member might periodically straddle multiple categories to make ends meet. Farm workers and informal traders, for instance, almost always cultivate their own home gardens and backyard plots, while others have small mango orchards. Despite this fluidity in the boundaries between categories, the household heads articulated a discernable sense of anchoring to a specific category.

7.3. Small-scale farmers' participation in the markets (formal and informal)

There are various marketing channels for small-scale mango farmers in the Mopani and Vhembe districts of Limpopo province. We have divided these marketing channels into two categories. Firstly, informal markets, which involve mainly informal linkages that exist between buyers and sellers and therefore do not involve *ex ante* and *ex post* relationship among the participants. Example of such markets includes informal traders, consumers in the communities and other buyers, such as public schools, hospitals, etc. Secondly, formal markets, which involve more structured linkages that are characterised by written contracts between buyers and sellers. Such markets also involve *ex ante* and *ex post* relationships between the participants. Example of such markets includes supermarkets and agro-processing factories.

The findings of this study indicate that the majority of the households were participating in the informal markets. About 54 out of the 234 households included in the study participated in formal markets. The conceptual framework used in this study emphasize that small-scale farmers' limited participation in the markets, particularly the formal markets, can be linked to the higher transaction costs they face when engaging in such markets.

7.4. Transaction costs influence small-scale farmers' participation in the markets

We have now established that small-scale farmers' participation in the markets is limited to informal market participation. We will now look at transaction cost variables that significantly influence households' participation in the markets. The literature indicates that gender is a very important variable influencing households' participation in the markets. This study established that there is a significant relationship between the gender of the household head and participation in the markets. More precisely, female-headed households are most likely to be excluded from participation in the high-value markets (formal markets) (see Pingali *et al.*, 2005). The results of this study correspond with the literature in that the majority of households participating in the formal markets were headed by males. About 32.4% of households participating in the formal markets were headed by males, in contrast to only 14.52% of female-headed households. There clearly is gender inequity with regard to participation in the formal markets.

The age of the household head was also found to have a significant relationship with participation in the markets. According to Pingali *et al.* (2005) and Makhura (2001), age is an indicator of experience in farming. As such, older farmers do not incur higher costs related to comprehending information and acting on it, given their familiarity with the markets. The results of this study indicate that the household heads participating in the formal markets had an average age of 52, compared to 44 years for those participating in the informal markets. This result therefore reinforces what Makhura (2001) and Pingali *et al.* (2005) found in their studies. However, these findings should be interpreted with caution, since we did not find a significant relationship between household heads' educational levels and participation in the markets.

Although the household heads participating in the informal markets are younger, they might not have formal schooling, compared to the older generation, which might have had formal schooling and thus participate in the formal markets. Makhura (2001) and Pingali *et al.* (2005) elaborate on educational attainment and the ability to comprehend information and thus reduce transaction costs.

Distance to the nearest town has also been found to have a significant relationship with the households' participation in the markets. Distance to the nearest town is used as a proxy for access to information (see Makhura, 2001). The underlying assumption is that farmers/households staying closer to the markets might have more access to information than those that stays far. Therefore, the closer the households are to town, the higher their participation in the formal markets. The results of this study found that households that are very far from the towns, i.e. more than 50 km, participate less in the formal markets. We can therefore accept the proposition of Makhura (2001) and conclude that distance matters when transacting with formal markets. This variable can also indicate that farmers staying closer to the market have access to salient information that affords them participation in the formal markets, in contrast to those staying far away.

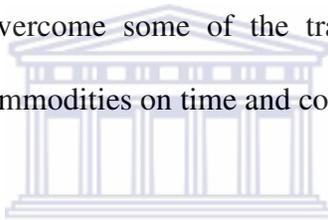
We expected that the majority of households staying closer to the markets (0 km to 25 km) would participate more in the markets. However, this was not the case. There are many explanations linked to this observed behaviour, some of which are not covered by this study. For example, Makhura (2001) indicated that road quality was also an important variable that directly affected households' participation in the markets. As such, if households are closer to the towns

but the condition of the roads is such that transport owners (since there are presumably few transporters in rural areas (see Machethe & Moyo, 2008)) are reluctant to transport goods from the farm to the markets, there will be poor participation in the formal markets. Makhura (2001) also indicated that effective demand in a particular locality was an important factor determining successful participation, e.g. farmers closer to towns where there is a big market for mango (e.g. Thohoyandou, an agro-processing hub for mangoes) are more likely to participate in the markets than farmers in Musina, for example, even though they are very close to the town.

Ownership of storage facilities was also found to have a significant relationship with households' participation in the markets. Storage facilities are directly linked to product quality in that households who own storage facilities are able to retain the freshness/shelf life of the mangoes (Jari & Fraser, 2009). Participation in the formal markets is directly influenced by the farmers' ability to conform to product quality requirements set by the buyers, especially supermarkets. Households that own storage facilities are able to overcome the transaction costs related to product quality. The results of this study suggest that the majority of households who own storage facilities are able to participate in the formal markets. About 61.40% of households that owned such facilities participated in the markets, compared to about 10.67% of households that did not own storage facilities and participated in the formal markets. This finding indicates that storage ownership is a very important variable influencing households' participation in the formal markets.

Ownership of a bakkie also has a significant relationship with the households' participation in the markets. Households that owned a bakkie, which is a transportation means, are able to

overcome direct transportation costs and thus can deliver goods to the markets on time and consistently. Timely and consistent supply is one of the requirements for participation in the formal markets. As such, ownership of a means of transport allows households to bridge the distance between production and sales points. The results of this study indicate that the majority of households owning a bakkie participated in the formal markets. About 64.41% of households that indicated ownership of a bakkie participated in the formal markets, compared to 9.09% of households that did not have access to a bakkie and participated in the formal markets. The insight we can draw from this finding is that a means of transportation is a very important factor determining the households' participation in the markets. With ownership of transportation means, households are able to overcome some of the transaction cost barriers (e.g. direct transport costs) and deliver their commodities on time and consistently.



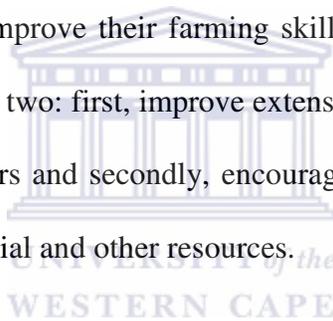
Farmers/households that belong to a farmers' organisation are more likely to participate in the formal markets compared to those that do not. The costs related to information, transportation and bargaining are substantially slashed by social networks. These results emphasise the importance of social capital in agricultural marketing, as has been discussed by other authors (see Markelova *et al.*, 2009)

Other transaction cost variables that have a significant relationship with participation in the formal markets can be classified under asset ownership. Asset specificity (Williamson, 1979) is also one of the factors that determine households' participation in the markets. Households that own larger amounts of assets such as arable land, higher household head income, pensions and

higher value of cattle were found to be participating more in the formal markets, compared to those that had fewer assets.

7.5. Policy recommendations

The main question asked in this report is: how can we reduce transaction costs to improve small-scale farmers' participation in and returns from output markets. Our findings suggest that there are three ways in which transaction costs can be reduced. The first policy recommendation hinges on women empowerment policies in the agricultural value chain so that females are not excluded from participating in the agrofood markets. Female farmers must be supported through variety of programmes that will improve their farming skills. Areas of intervention to achieve this objective can be classified into two: first, improve extension services provided to small-scale farmers in favour of female farmers and secondly, encourage females to participate in farming through providing necessary financial and other resources.



The second policy recommendation is related to the importance of infrastructure in rural areas. Access to storage facilities, for example, remains a critical determinant of small farmer's participation in output markets for- especially for perishable subtropical crops. Farmers owning storage facilities are more likely to participate in the formal markets compared to those who do not have access to this infrastructure. To improve farmer's participation in more rewarding market outlets, we recommend that public and private investments should be provided to build and improve storage facilities in rural areas. However, investment in such post-harvest infrastructure must be targeted in localities with identified need. Also, types of storage facilities

differ for each type of crop produced by farmers. For example, mango farmers would prefer cold storage infrastructure compared to grain farmers to whom silos may be very important.

Transportation and longer distances to output markets also came out as an important determinant of whether farmers participate in the formal markets or not. Farmers who own transportation means and those staying closer to the markets participate more in the formal markets compared to those who do not own storage facilities and live further away from the markets. This study recommends two ways to reduce transaction costs faced by these farmers. First, transportation should be provided for farmers through private or public means. The most common problem in rural areas that have negative impact on farmers' ability to secure rewarding market hinges around lack of transportation (*see* Machethe, 2004). As such providing transportation for farmers will improve market access and participation. However, needs analysis for this type of investment should be conducted to identify type of investment required and volume. Secondly, bringing the market closer to farmers can cut transportation costs and thus transaction costs. In Vhembe district for example, investment in a decentralized municipal agro-food market is underway, where farmers will be able to access a one-stop market connected to the Joburg fresh produce market.

The fourth most important factor is associated with whether or not farmers participate in an organization. There is an increased likelihood that farmers participate in the formal markets if they belong or participate in farmer associations/organization. The farmer associations/organizations serve as a platform where farmers share information and sometimes

share common infrastructure and transportation facilities. Therefore an effort to facilitate organized farming can lead to farmers' participation in the markets increased or improved.

7.6. Areas for further research

Through this study focused on resource-poor small mango farmers in Limpopo, it has been possible to identify several concerns that warrant further research:

- Controlling for mango variety (or cultivar type) might be worth exploring, because different mango varieties appear to be preferred in different markets. Some mango varieties are good for further processing, while others are good as fresh fruit.
- How formal arrangements (buyer-initiated contracts) between small farm households and buyers in the formal markets evolve and manifests requires explicit and more robust empirical investigation. There are various types of contracts and these might result in different outcomes for household participation in formal markets. The nature of the contractual arrangements requires further research to understand what types of contracts have an influence on households' participation in formal markets.
- Power relations along the agro-food value chains are closely related to contractual relations and seem to influence the household's returns from the markets. However, testing power relations in an empirical model could be very challenging. More research effort needs to be invested to incorporate power relations within the transaction costs analysis to examine realistic and plausible types of relations between buyers (agro-food industries) and sellers (farmers).

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Control Form Number	
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APPENDIX 1

Exploring Farm Market access problems, Limpopo province

Introductory notes for fieldworkers:

I am grateful to have you as one of my participants in this study exercise being conducted by the University of the Western Cape. The study is being conducted throughout Limpopo Province covering areas in the Vhembe and Mopane districts. The study targets households such as small-scale farmers, farm laborers, informal traders, etc. The study has TWO objectives a) to generate a better profile of farm-based livelihoods and (b) understand the livelihoods strategies of selling their produce, and effects for the households of increased prices of their produce. Covers some sections for all households, and specific sectors for *farmers, farm-workers* and *informal traders*.

Date of interview: _____

Name of fieldworker: _____

Location/district: _____

Interview number: _____

Rural/group category: _____



Hsld Tracking	Code
Household code: 000-00-0000	
Start time:	End Time:
Exact distance to Tzaneen (km)	
Exact distance to Mussina (km)	
Exact distance to Thohoyandou	

SECTION A: GENERAL BACKGROUND

Record 100: Household demographic profiling

Are you the HEAD of HH?	Sex M/F	Resident/non resident	If respondent is NOT head of HH how is he/she related?	How many people live in this household in total?			What's would say is your main Occupation	<input checked="" type="checkbox"/>	Tick if you have a second occupation	<input checked="" type="checkbox"/>	Highest level of educational attained
Yes/No	M/F	Res/Non	Spouse	# of adults (>18 yrs)	# of children (<17 yrs)	Total h/h size	1. Farmer		1. Farmer		1. Primary [grade 1-7] /ABET
			Son				2. Farm worker		2. Farm worker		2. Secondary
			Daughter				3. Informal trader		3. Informal trader		3. Matric
			Other (specify)				4. Unemployed		4. Other (specify)		4. technical college
							5. Other (specify)				5. other (specify)
											6. none

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Record 110. In what position do your household mainly work with agricultural production and trade?

Activity	Main activity (Tick for one)	Tick if you have a second activity
Producing on land owned by my family	Y N	Y N
Producing on communal Land with PTO	Y N	Y N
Producing	Y	Y

on rented land	N	N
Producing with other households on jointly owned land	Y N	Y N
Working for farmer	Y N	Y N
Selling agricultural produce	Y N	Y N
Transporting produce to the market	Y N	Y N

Record 120: In-depth Household Income

profiling

Please answer the following about the working members in the household, starting with the household head, thinking about the past 12 months.

☺ Use Codes*	<input checked="" type="checkbox"/> Employment status 2007	DoB	<input checked="" type="checkbox"/> Receives income from...?	What your income level or income range per month...?	
				Stated Income level	<input checked="" type="checkbox"/> Indicated income range
	•			• _____	<input checked="" type="checkbox"/> < 500 500-749 750-999 R1,000 – 1999 R2,000 – 2999 R3,000 – 3999 R4,000 or more
	<ul style="list-style-type: none"> • permanent • causal • seasonal • part time/contract • retired • unemployed • other (specify) 		<ul style="list-style-type: none"> ___ Wages/salary from regular job ___ Wages from piece jobs ___ Income from own or family business ___ Informal trading ___ Pensions or grants ___ Selling farm/garden products ___ Remittances ___ None 	• _____	<input checked="" type="checkbox"/> < 500 500-749 750-999 R1,000 – 1999 R2,000 – 2999 R3,000 – 3999 R4,000 or more
	<ul style="list-style-type: none"> • permanent • causal • seasonal • part time/contract • retired • unemployed • other (specify) 		<ul style="list-style-type: none"> ___ Wages/salary from regular job ___ Wages from piece jobs ___ Income from own or family business ___ Informal trading ___ Pensions or grants ___ Selling farm/garden products ___ Remittances ___ None 	• _____	<input checked="" type="checkbox"/> < 500 500-749 750-999
	<ul style="list-style-type: none"> • permanent • causal • seasonal 		<ul style="list-style-type: none"> ___ Wages/salary from regular job ___ Wages from piece jobs ___ Income from own or family business 	• _____	<input checked="" type="checkbox"/> < 500 500-749 750-999

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Record 140: Basic Asset ownership

Does your household own any of the following assets?		
a) Immovable assets:	<input checked="" type="checkbox"/>	Quantity/Number/size
• Farm land		
• Brick House		
• Shack (wooden/ corrugated iron)/ informal dwelling		
• Storage facilities		
• Other		
b) Movable assets		
<ul style="list-style-type: none"> ▪ Tractor ▪ Motorcar - sedan ▪ Motorcar – pick-up ▪ Motor cycle ▪ other 		
c) Financial assets		
<ul style="list-style-type: none"> • pension • savings • ROSCAS • Shares • Monthly income • Other 		
d) Livestock assets		
<ul style="list-style-type: none"> • Cattle • Goats • Sheep • Pigs • poultry • Other 		
e) Other Assets		
• Specify		



Record 160: In the last 12 months did you spend any money on the following?

		 Total spent in Rand	On credit (tick)
A)	Medical care		Y N
B)	Medicines		Y N
C)	Clothing, shoes		Y N
D)	Equipment, tools		Y N
E)	Furniture		Y N
F)	Construction, house repair		Y N
G)	Hiring labour		Y N
H)	School fees & uniforms, etc.		Y N
I)	Celebrations, social events		Y N
J)	Funerals		Y N
K)	Other1 (Specify)		Y N
L)	Other1 (Specify)		Y N



170 In the past 12 months, did any member of this household go hungry because there wasn't enough food? *[Read out option.]*

Frequency of hungry	Tick	
Never or seldom	Y	N
Sometimes	Y	N
Often or always	Y	N
Don't know/Refuse	Y	N



SECTION C: FARMERS ONLY

This section is ONLY for households that specify Farmer as their main occupation in Record 100

Record 180: Household food production, consumption and sales revenue

Please list all of the foods or crops you and/or your household have grown on your land here over the past 12 months:

	Food/crop	Land Size Used by Crop Type (hectares)	Mainly for own consumption for sale or for donation?	How many units were sold?	How many units were for own consumption	How many units were for donation?
a.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			
b.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			
c.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			

d.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			
e.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			
f.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			
g.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation <input type="checkbox"/> More or less equally for each			
h.			<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> Mainly for donation			

Record 190: How many people provided labour on the household's land in the past 12 months?

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	<i>On your land</i> ✍							
	Casual/seasonal				Full time			
	# Paid people	Wage per day	Total Days Worked	# Unpaid people	# Paid people	Wage per day	Total Days Worked	# Unpaid people
Family								
Non-family								

Record 200: How much in total, if anything, did your household spend in the past 12 months on...

	On your land only ✍
Wages for workers?	
Seed?	
Ploughing?	
Fertiliser?	

Pesticides?	
Tools/equipment?	
Medicine for animals	
Transport/Fuel	



Record 210: How many animals/livestock do you/your household own today?

	© Type of livestock	Number/size of herd 	Mainly for own consumption or sale?
1.	Cattle		<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> More or less equally for each
2.	Goats		<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> More or less equally for each
3.	Sheep		<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> More or less equally for each
4.	Pigs		<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> More or less equally for each
5.	Chickens		<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> More or less equally for each
6.	Other		<input type="checkbox"/> Mainly for own consumption <input type="checkbox"/> Mainly for sale <input type="checkbox"/> More or less equally for each



SECTION D: FARMWORKERS ONLY

This section is ONLY for households that specify Farmworker as their main occupation in Record 100

Record 220: Your working conditions

Your contract with the farmer	Tick <input checked="" type="checkbox"/>	Your working hours	No. of hours daily
1. Permanent contract		Monday to Friday, season	
2. Working permanently, only casual contract		Saturday, season	
3. Casual worker in season		Sunday, season	
4. Casual worker, specific job		Monday to Friday, out of season	
5. No contract		Saturday, out of season	
6. Other (specify)		Sunday, out of season	

Record 230: Your payment and benefits from the farm work

Your wage in cash	Specify amount	Your other benefits	Yes/No	
				
1. Monthly payment in season		Food included during the working hours	Y	N
2. Monthly payment out of season		Can take staple food back home to family	Y	N
3. If paid per day: How much daily in season		Can take all produce back home to family	Y	N
4. If paid per day: How much per day out of season		Other benefits, specify	Y	N
5. No contract		Working clothes	Y	N
6. Other (specify)		Shoes for work	Y	N

Record 240: Housing

Specify where you live	Tick <input checked="" type="checkbox"/>	If you live on the farm, but family outside		If you and your family live on farm	
1. I live off farm with my family		1. I get housing on the farm for free		1. We get housing for free	
2. My family lives off farm, I stay on farm during the week		2. Payment for housing is deducted from my wage (specify amount per month)		2. We pay for housing, specify monthly amount	
3. My family and myself live on the farm		3. Other benefits, specify		3. No of rooms available for us	
4. Other (specify)				4. Do you have your own kitchen?	
				5. Other benefits (specify)	

Record 250: Transport – *only if you or your family live off the farm*

Transport to farm during the week		Transport to farm in the weekend	
1. I live on the farm – no need for transport		1. I live on the farm – no need for transport	
2. Distance from your house to the farm		2. Distance from your house to the farm	
3. I walk to the farm daily (Tick yes/no)		3. I walk to the farm (Tick yes/no)	
4. I go by taxi (specify payment per one way trip)		4. I go by taxi (specify payment per one way trip)	
5. I am collected by the farmer (specify if payment)		5. I am collected by the farmer (specify if payment)	
6. Other (specify)		6. Other (specify)	

Record 260: Your options of making a living.

Do you at present look for a better option to make a living?		What is your next option if you miss your present occupation	
1. No – I am satisfied as present – working on a farm		1. Informal trader	
2. Yes, I look for a better option		2. Subsistence farmer on home plot	
3.. Can you specify what you hope for as a better option to make a living?		3. Migrant worker	
		4. Unemployed	
Other (comments)		5. Living on grants and remittances (specify amount)	

Record 270: The supply to your household for own consumption

Do your household supply some products for its own consumption?	Tick (only one) <input checked="" type="checkbox"/>	If you buy food, from whom do you buy?	
1. No – I buy everything, including staple food		1. Other informal traders	
2. I grow <i>all</i> staple food at my own plot – other items I also buy		2. Small farmers locally	
3.. I grow <i>most of</i> the staple food at my own plot – but I also buy some		3. Commercial farmers	
4. I grow <i>less than</i> half of the staple food at my own plot – the rest I buy		4. Formal shops	
5. Other (specify)		5. Supermarkets (Spar etc)	
		6. Other (specify)	

SECTION E: INFORMAL TRADERS ONLY

This section is ONLY for households that specify Informal trading as their main occupation in Record 100

Record 280: Which products do you sell as an informal trader (informal roadside trader and "bakkie" traders)

Specify your <i>main</i> kind of products	Tick for one group only <input checked="" type="checkbox"/>	Less important produce sold	Tick <input checked="" type="checkbox"/>
Fruits - Citrus (oranges)		Fruits - Citrus	
Mangoes		Mangoes	
Bananas		Bananas	
Litchis		Litchis	
Other (specify)		Other (specify)	
Vegetables - Cabbage		Vegetables - Cabbage	
Spinach		Spinach	
Onions		Onions	
Tomatoes		Tomatoes	
Maize/corn		Maize/corn	
Potatoes		Potatoes	
Muxe/Morogo		Muxe/Morogo	
Other (specify)		Other (specify)	

Record 290: Your working conditions

Where do you usually sell?	Tick <input checked="" type="checkbox"/>	When do you sell your products	Specify season	No. of hours daily
1. Market at the roadside – permanent stall		Monday to Friday, specify main season		
2. At the road – no permanent stall		Saturday, specify main season		
3. Outside formal market / Supermarket		Sunday, specify main season		
4. Local market		Monday to Friday, out of season		
5. No permanent place for selling		Saturday, out of season		
6. Other (specify)		Sunday, out of season		

Record 300: Who supplies your products

Specify where you get your <i>main</i> supply of products	Tick <input checked="" type="checkbox"/>	Specify if you has a second source for supply	Tick <input checked="" type="checkbox"/>
1. Own produce		0. No other supply of products	
2. Supplies from hawkers		1. Own produce	
3. Supplies from small farmers		2. Supplies from hawkers	
4. Supplies from commercial farmers		3. Supplies from small farmers	
5. Other (specify)		4. Supplies from commercial farmers	
		5. Other (specify)	

Record 310: How do you get your supply to your stall?

How do you mainly get your supplies?	Tick <input checked="" type="checkbox"/>	Specify if you have a second way to receive your products	Tick <input checked="" type="checkbox"/>
1. Own Transport		0. No other supply of products	
2. Transport of hawkers		1. Own Transport	
3. Farmers will		2. Transport of hawkers	
4. Supplies from commercial farmers		3. Farmers will	
5. Other (specify)		4. Supplies from commercial farmers	
		5. Other (specify)	

Record 320: The supply to your household for own consumption

Do your household supply some products for its own consumption?	Tick (only one) <input checked="" type="checkbox"/>	If you buy food, from whom do you buy?	
1. No – I buy everything, including staple food		1. Other informal traders	
2. I grow <i>all</i> staple food at my own plot – other items I also buy		2. Small farmers locally	
3.. I grow <i>most of</i> the staple food at my own plot – but I also buy some		3. Commercial farmers	
4. I grow <i>less than</i> half of the staple food at my own plot – the rest I buy		4. Formal shops	
5. Other (specify)		5. Supermarkets (Spar etc)	
		6. Other (specify)	

Record 330: Your options of making a living.

Do you at present look for a <i>better option</i> to make a living?	Tick <input checked="" type="checkbox"/>	What is your next option if you miss your present occupation	
1. No – I am satisfied as present – working as an informal trader		1. Farmworker	
2. Yes, I look for a better option		2. Subsistence farmer on home plot	
3.. Can you specify what you hope for as a better option to make a living?		3. Migrant worker	
		4. Unemployed	
Other (comments)		5. Living on grants and remittances (specify amount)	

Section F: Detailed Sales Information

Record 340: How frequently in the **last 12 months** did this farming household sell in exchange for money (*or donated in kind*) any of the following crops?

Crops	5 or more times spread across 12 months	Early season	Mid season	Late season	Off-Season
Cabbage	Y N	Y N	Y N	Y N	Y N
Spinach	Y N	Y N	Y N	Y N	Y N
Tomatoes	Y N	Y N	Y N	Y N	Y N
Muxe	Y N	Y N	Y N	Y N	Y N
Butternut	Y N	Y N	Y N	Y N	Y N
Pumpkin	Y N	Y N	Y N	Y N	Y N
Mangoes	Y N	Y N	Y N	Y N	Y N
Oranges	Y N	Y N	Y N	Y N	Y N
Other (specify)	Y N	Y N	Y N	Y N	Y N

Record 350: Before a specific sales transaction, **do you determine a selling price for the crop** you have cultivated/grown to sell?
Yes/No (*circle the correct response...*)

Record 360: What is the degree of importance you attach to the following factors when calculating your own selling price?

	Highly important	Important	Not very important
Production input costs	Y N	Y N	Y N
National Market Price for crop	Y N	Y N	Y N
Local price for crop	Y N	Y N	Y N
Distance from market	Y N	Y N	Y N
Number of buyers wanting commodity	Y N	Y N	Y N
Buyer's profile (who is the buyer?)	Y N	Y N	Y N
Other (specify...); <i>drought; risks, shocks, etc</i>	Y N	Y N	Y N

Record 370: When transacting with any of the following buyers, **how was the final (or actual) selling price arrived at?** (*Which price is finally settled on? What are the reasons for computing the final selling price in this way?*)

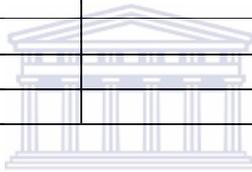
Buyers	Seller sets the price	Buyer sets price	Negotiated agreement on price
Hawkers/informal traders	Y N	Y N	Y N
Supermarkets	Y N	Y N	Y N
Processing Factory (mills, etc)	Y N	Y N	Y N
Consumers in community	Y N	Y N	Y N
Other (specify)	Y N	Y N	Y N

Record 380: What was the **main way of delivering the sold product** delivered to each of the buyers?

Buyers	Hawkers/informal traders	Supermarkets	Processing Factory (mills, etc)	Consumers in community	Other (specify)
Farm-gate sales at sellers expense	Y N	Y N	Y N	Y N	Y N
Farm-gate sales at buyers expense	Y N	Y N	Y N	Y N	Y N
Off-farm at sellers expense	Y N	Y N	Y N	Y N	Y N
Off-farm at buyers expense	Y N	Y N	Y N	Y N	Y N
Through a broker at zero expense	Y N	Y N	Y N	Y N	Y N
Through a broker at fixed commission (percentage of total sales)	Y N	Y N	Y N	Y N	Y N
Through a pack house at zero expense	Y N	Y N	Y N	Y N	Y N
Through a pack house fixed commission (percentage of total sales)	Y N	Y N	Y N	Y N	Y N
	Y N	Y N	Y N	Y N	Y N

Record 390: In the **early season** (given the months stated above) what was the quantity (bundles, crates, box, bucket, other measurement) and unit price you sold to each of the following

☞		Hawkers/informal traders ☞		Supermarkets ☞		Fresh Product Market ☞		Processing Factory ☞		Other ☞	
		Units	Price	units	price	units	price	Units	Price	units	price
Cabbage	Y/N										
Spinach	Y/N										
Tomatoes	Y/N										
Muxe/Morogo	Y/N										
Butternut	Y/N										
Pumpkin	Y/N										
Mangoes	Y/N										
Oranges	Y/N										
Other (specify)	Y/N										



Record 400: In the **early season**, did you have any alternatives to growing and selling crops (or farming activities)? **Yes/No** (circle the correct response... If yes, go the next record.)

Record 410: Please rank those alternatives from 1-3 in the order of top to least important options.

	Ranking, 1-3 and "0" elsewhere ☞
Be unemployed/jobless	
Work in city/town	
Work in mines	
Work on neighbouring farm	
Take up informal trading	
Apply for and access a state grant (pension, etc)	
Other (specify)	

Record 420: In the **PEAK/MID season** (given the months stated above) what was the quantity (bundles, crates, box, bucket, other measurement) and unit price you sold to each of the following

☞		Hawkers/informal traders☞		Supermarkets☞		Fresh Product Market☞		Processing Factory☞		Other☞	
		Units	Price	units	price	units	price	Units	Price	units	price
Cabbage	Y/N										
Spinach	Y/N										
Tomatoes	Y/N										
Muxe/Morogo	Y/N										
Butternut	Y/N										
Pumpkin	Y/N										
Mangoes	Y/N										
Oranges	Y/N										
Other (specify)	Y/N										

Record 430: In the **PEAK/MID season**, did you have any alternatives to growing and selling crops (or farming activities)? **Yes/No** (circle the correct response... If yes, go the next record.)

Record 440: Please rank those alternatives from 1-3 in the order of top to least important options.

	Ranking, 1-3 and "0" elsewhere ☞
Be unemployed/jobless	
Work in city/town	
Work in mines	
Work on neighbouring farm	
Take up informal trading	
Apply for and access a state grant (pension, etc)	
Other (specify)	

Record 450: In the **LATE season** (given the months stated above) what was the quantity (bundles, crates, box, bucket, other measurement) and unit price you sold to each of the following

☞		Hawkers/informal traders☞		Supermarkets☞		Fresh Product Market☞		Processing Factory☞		Other☞	
		Units	Price	units	price	units	price	Units	Price	units	price
Cabbage	Y/N										
Spinach	Y/N										
Tomatoes	Y/N										
Muxe/Morogo	Y/N										
Butternut	Y/N										
Pumpkin	Y/N										
Mangoes	Y/N										
Oranges	Y/N										
Other (specify)	Y/N										

Record 460: In the **LATE season**, did you have any alternatives to growing and selling crops (or farming activities)? **Yes/No** (circle the correct response... If yes, go the next record.)

Record 470: Please rank those alternatives from 1-3 in the order of top to least important options.

	Ranking, 1-3 and "0" elsewhere ☞
Be unemployed/jobless	
Work in city/town	
Work in mines	
Work on neighbouring farm	
Take up informal trading	
Apply for and access a state grant (pension, etc)	
Other (specify)	

Record 480: In the **OFF- season** (given the months stated above) what was the quantity (bundles, crates, box, bucket, other measurement) and unit price you sold to each of the following

☞		Hawkers/informal traders☞		Supermarkets☞		Fresh Product Market☞		Processing Factory☞		Other☞	
		Units	Price	units	price	units	price	Units	Price	units	price
Cabbage	Y/N										
Spinach	Y/N										
Tomatoes	Y/N										
Muxe/Morogo	Y/N										
Butternut	Y/N										
Pumpkin	Y/N										
Mangoes	Y/N										
Oranges	Y/N										
Other (specify)	Y/N										



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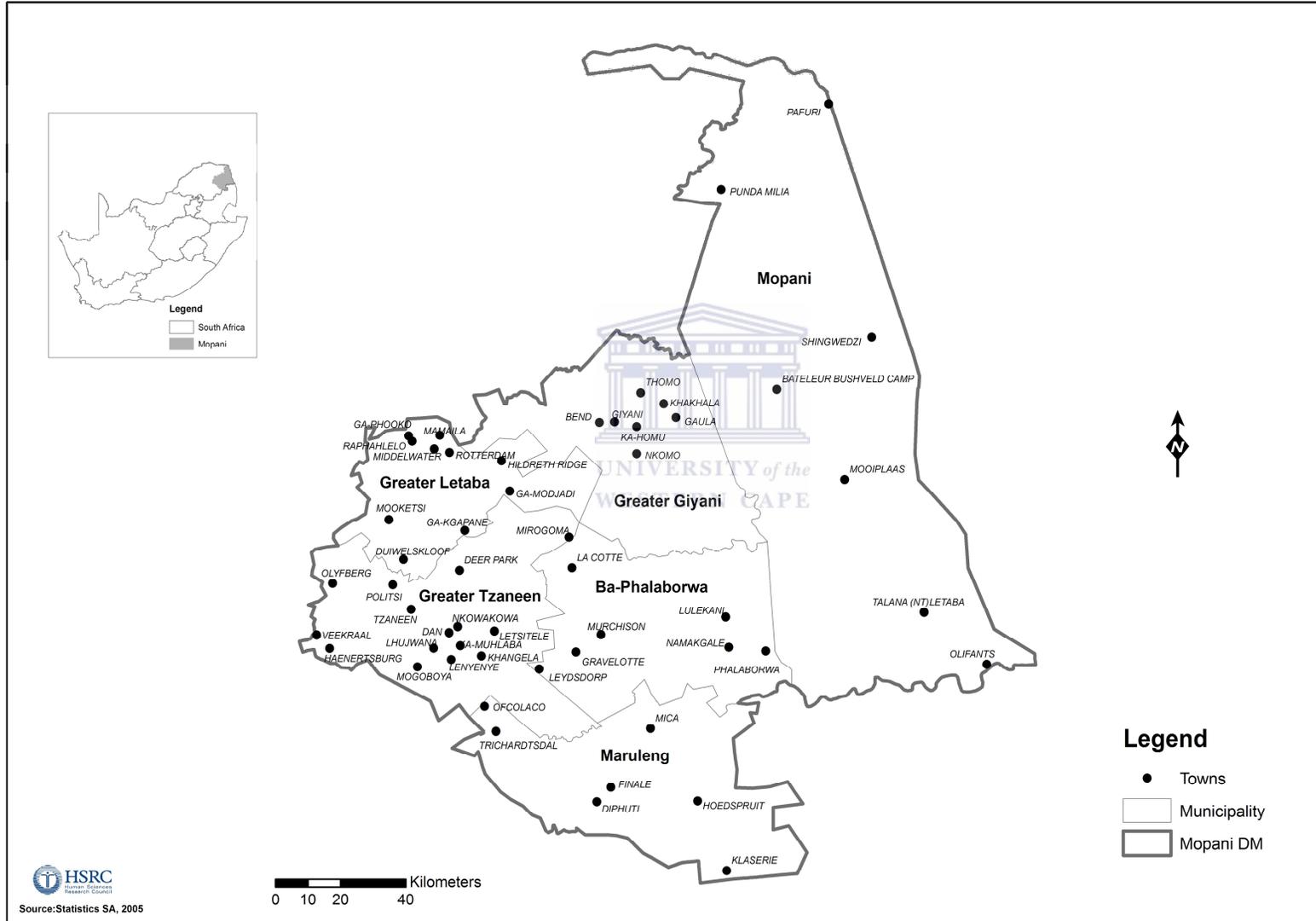
Record 490: In the **OFF-season**, did you have any alternatives to growing and selling crops (or farming activities)? **Yes/No** (circle the correct response... If yes, go the next record.)

Record 500: Please rank those alternatives from 1-3 in the order of top to least important options.

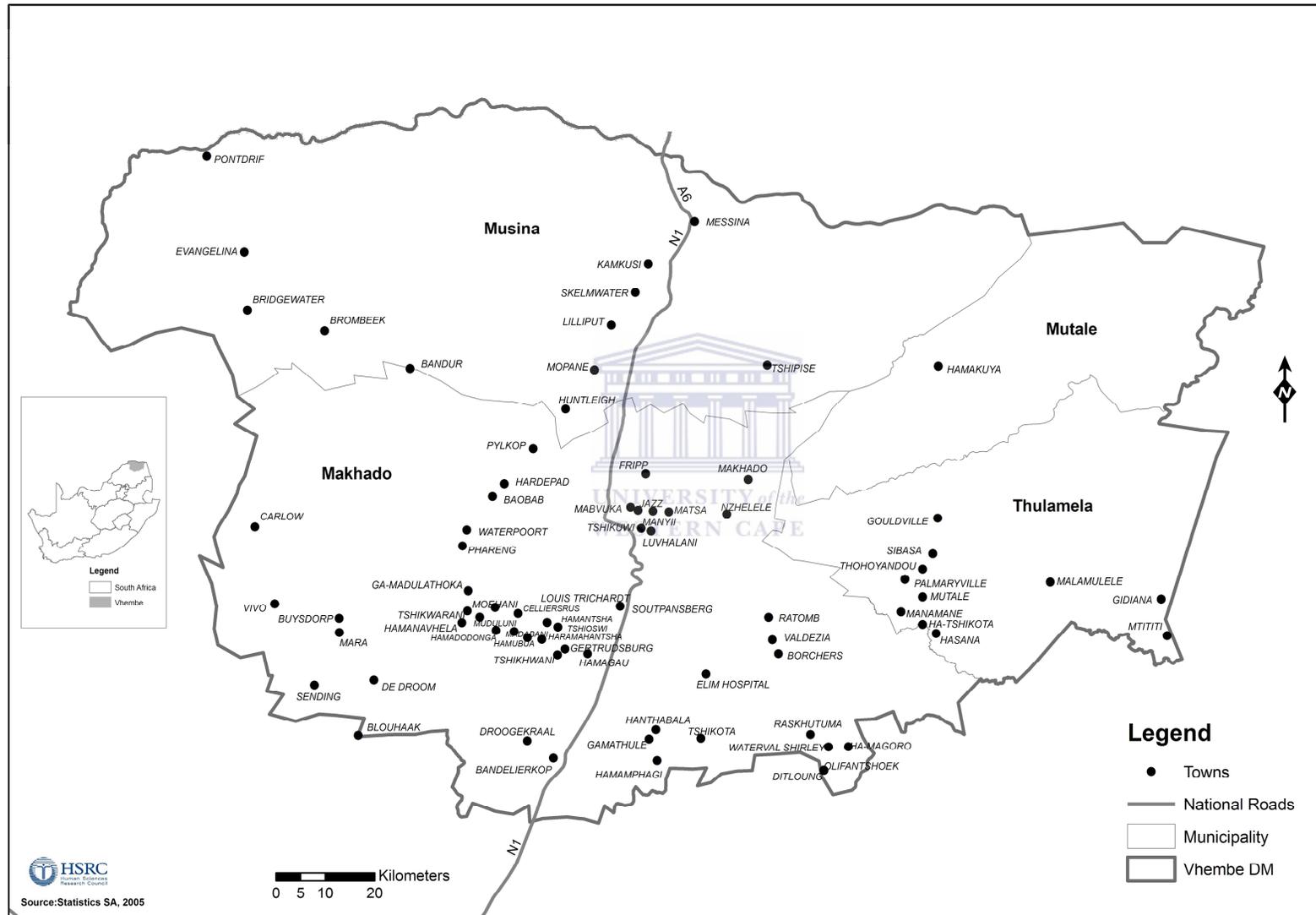
	Ranking, 1-3 and "0" elsewhere ☞
Be unemployed/jobless	
Work in city/town	
Work in mines	
Work on neighbouring farm	
Take up informal trading	
Apply for and access a state grant (pension, etc)	
Other (specify)	

End of questionnaire ,Thanks for your time

APPENDIX 2



APPENDIX 3



Source: Statistics SA, 2005