

The inclusion of smallholders in modern market channels in South Africa

An analysis of the determinants of market channel choice

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Abbreviations

FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GGP	Gross Geographic product
HACCP	Hazard Analysis Critical Control Points
ISO	International Standard for Organisations
WTO	World Trade Organisation

Exchange rate

The prices in this thesis are converted using the exchange rate of 06/09/2006.
One Euro is 9.18 South African Rand.

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Abstract

This study explores the inclusion of smallholders in modern market channels in South Africa. The study is directed at smallholders that are producing tomatoes and is carried out in Limpopo and Mpumalanga, two provinces in the north of South Africa.

In recent years modern market channels like supermarkets have become more important on developing countries' markets. Three forces are important in driving the rise of supermarkets, they are: (1) a change in consumer demand, (2) FDI and (3) the availability of modern procurement system technology. For the producers wanting to supply to modern market channels these changes had a significant impact. They had to change their production and transportation systems in order to meet the strict requirements of supermarkets. Especially smallholders are excluded by these requirements and cannot find access to modern market channels.

The analysis in this study is based on a survey carried out by the Regoverning Markets project at the university of Pretoria. An econometric analysis was carried out to find out the differences between producers in traditional and modern market channels. Furthermore the determinants for market channel choice were analysed using a probit model. The main outcomes of this analysis are that farm household factors such as age, location, household size and membership of a cooperative are most important in determining market channel choice. A positive outcome for smallholders was that size of arable land and experience are non-significant in determining market channel.

1. Introduction

1.1 Background

Supermarkets are increasingly emerging in developing countries' markets as an important player. The first of the developing country regions to develop a supermarket-market was Latin America. East and Southeast Asia had a similar development of supermarkets as Latin America, but were some 5-7 years behind. Africa was another 5 years behind; South Africa was the first country in Africa to develop a supermarket-market (Weatherspoon and Reardon, 2003). Supermarkets are becoming more important, not just for rich and middle class consumers; supermarkets are rapidly expanding into poor neighbourhoods (Traill, 2006).

As supermarkets are arising in developing countries, they replace traditional, small scale, usually family-owned food stores (Goldman et al., 2002). This development is similar to the development of supermarkets in, for example the United States, decades ago (Regmi and Gehlhar, 2005). Yet traditional stores and markets are still very important in developing countries (Regmi and Gehlhar, 2005). In South Africa for example the supermarket share is around 50% of the total food retail sales (Reardon et al., 2003; Traill, 2006).

This is still far behind UK or US (Weatherspoon and Reardon, 2003) with a share of 88% and 90% respectively. Hence supermarkets in Africa are not, and will not in the near future, be the only format; traditional stores and markets will remain to cover a considerable part of total food sales. In this report the traditional stores and markets will not be looked at, however it is important to keep in mind that supermarkets are not the only relevant market option.

For fresh fruits and vegetables, especially highly perishable items, sales through supermarkets in developing countries are usually lower, because this involves a more complicated supply chain. On the other hand, consumers may prefer the quality of fruits and vegetables that is offered on daily markets (Regmi and Gehlhar, 2005). Therefore in developing countries, supermarkets (especially those directed at middle class and poor consumers) mainly supply dry food and less perishable fruits and vegetables (Shepherd, 2005).

The changing retail sector has increasingly stringent demands on their trading partners. For producers wanting to supply to these modern, restructured markets this holds both opportunities and threats. On the one hand the supermarket-market is seen as a promising sector; the availability of supermarkets therefore extends the set of market channel options. On the other

hand the supply requirements of supermarkets are very high, which is a barrier of entry to certain producers; especially traditional small farmers are excluded.

1.2 Research objectives

This research aims to study the situation of smallholder¹ farmers in general and tomato farmers in particular and give insight in their market channel options. South Africa is home to this study. South Africa was chosen, because the supermarket-market has already undergone a significant process of modernisation. This study focuses on the production and marketing of tomatoes; in the 2004/2005 season tomatoes were the second most produced vegetable in South Africa, after sweet corn (NDA, 2007a). Smallholders produce a large part of the production; the production of tomatoes doesn't require high capital intensity of production and it is therefore a suitable product for smallholders (NDA, 2007b). The research areas are Limpopo and Mpumalanga, two provinces in the north of South Africa. Most tomatoes are produced in these provinces; in 2004 Limpopo had 3,100 hectares of tomatoes and in Mpumalanga 900 hectares of tomatoes were produced. This is almost 70% of the total tomato production in South Africa (NDA, 2006). Furthermore these provinces are in close proximity to Gauteng, the major consumption hub in South Africa.

1.3 Research questions

The main research question of this thesis is: Which farm household characteristics determine market channel choice for producers? This main question is divided in 5 sub questions:

1. How did the supermarket-market develop in South Africa in comparison to developed and other developing countries?
2. What are the drivers of this change?
3. What is the position of smallholder farmers in this process?
4. What differences can be found between farmers that supply to modern market channels and those that only supply to traditional channels?
5. Which of those factors are significant in determining market channel choice of smallholder tomato farmers in Limpopo and Mpumalanga?

Questions 1, 2 and 3 will be answered by means of a literature research. Research question 4 will be answered by means of an explorative econometric

¹ Smallholders are defined as 'households which derive their income mainly from agriculture, utilise mainly family labour in farm production and are characterised by partial engagement in input and output markets which are often imperfect or incomplete' (Ellis, 1993).

analysis of the database used for this study. Question 5 will be answered by means of a probit analysis.

1.4 Research hypothesis

The main hypotheses of this thesis are:

1. Farmers that supply to modern market channels have a bigger plot size, have a higher capital index and have a modern way of producing (using hybrid seeds and producing table tomatoes);
2. Selling to a modern market channel is more profitable; farmers selling to a modern channel have a higher income; and
3. Farm household characteristics such as farm size, experience and education determine market channel choice of smallholder farmers.

1.5 Limitations of study

During the analysis some problems were encountered with respect to the database. Due to time limitations this analysis is not based on the final version of the database, therefore the results are less reliable. More information about the limitations of study can be found in the epilogue on page 71.

1.6 Outline of thesis

This report is structured as follows. Chapter 2 will start with an introduction to South Africa, including Limpopo and Mpumalanga. Chapter 3 describes supermarket development and its drivers. In chapter 4 the methodology will be described. Chapter 5 deals with the results of the analysis of the database and in the last chapter, chapter 6, the conclusions and recommendations are given.

2. Introduction to South Africa

2.1 South Africa

South Africa is located at the southernmost tip of the African continent. The country shares borders with Botswana, Mozambique, Namibia, Swaziland and Zimbabwe. Lesotho is enclosed in South Africa (see Figure 1). South Africa has a population of about 47 million people, of which 80% are Africans, 10% are white and the other 10 percent consists of coloured, Indians, Asians and others (Agricultural Statistics, 2007). In 2002 average life expectancy at birth was 42 years, mainly due to HIV/AIDS; about 20% of the South African population is infected (Dorrington, 2002)).

There are 11 official languages of which Zulu and Xhosa are the two most spoken and a native language to respectively 23.8% and 17.6% of the population. Afrikaans is a native language for 13.3% of the population. English is the fifth most important language, a native language to 8.2% of South Africans, but a lot more have English as a second language (South Africa Info, 2007).



Figure 1: Map of South Africa and the provinces

Source: South Africa Info, 2007

South Africa is a large country, which has implications for the climate. Different zones can be recognised, which each have their own climate. Climatic conditions generally range from Mediterranean in the southwestern corner of the country to temperate in the interior plateau, and subtropical in the northeast. In

the northwest there is a small area that has a desert climate. In general one can say that most of the country has warm, sunny days and cool nights. Altitude has a high impact on temperature, furthermore variations in terrain and ocean currents also determine temperatures. Therefore large variation is observed in the temperature in different regions. The average annual temperature in Cape Town is 17°C, and in Pretoria, 17.5°C, maximum temperatures however often exceed 32°C in the summer, and can even reach 38°C in some areas of the far north. Most rainfall is observed during summer (November through March), but in the southwest (around the Cape of Good Hope) rainfall often occurs in winter (June through August). There is also much variation observed in rainfall; yearly rainfall ranges from 200 millimetres in the northwest to 900 millimetres of rainfall per year in the eastern Highveld, sometimes even exceeding 2,000 millimetres (Photius, 2007).

South Africa possesses modern infrastructure; the country has a good transport network, seaports and international airports (Sippo, 2006). This supports distribution of goods between the major cities. However not the whole of South Africa is well developed, there are large areas that are less developed and harder to reach. This is mainly due to the Apartheid policy that was ended in 1996; during this period certain areas were appointed to certain groups of people. Black Africans were forced to move to these less fertile, less developed areas, the so-called homelands. These areas are to this day still less developed in many aspects (Netshitenzhe and Chikane, 2006).

2.1.1 Economic profile

Apartheid also had a strong influence on the South African economy. Therefore economic indicators will give a one-sided view. One must always keep in mind that South Africa is a dual economy; it can be considered a developing country on the one hand, with many previously disadvantaged people still experiencing the effects of the Apartheid period. This group experiences high unemployment rates, many people are working in the informal sector and agriculture is one of the most important sources of their livelihoods, which is similar to many other developing countries. On the other hand South Africa can be considered a developed country, with high productivity and a high rate of industrialisation; South Africa can compete with developed countries on the world market (Reynolds, 2003).

Gross Domestic Product (GDP) growth is rising in South Africa, from 1.61% in 2000 to 4.44% in 2004 (World Development Indicators, 2007). However inequality is very high. The Gini-coefficient (a measure for economic equality, indicating total equality if 0 and total inequality if 1) rose from 0.596 in 1995, to 0.635 in 2002, indicating that inequality is very high and still rising. Inequality is the highest among black Africans (Van der Berg et al., 2005).

Unemployment is very high in South Africa, reaching 27.5% in 2005. Especially black South Africans experience fierce unemployment. The unemployment rate among this group is 32.9%. Of all South African provinces the Eastern Cape has the highest unemployment rate (35.1%). Yet the unemployment rate is decreasing, since in 2001 it was still as high as 29.4% (GHS, 2006).

Another indicator for the South African economy is the inflation rate. Inflation is decreasing; in 2002 the inflation rate was 9.2% and this dropped to only 1.4% in 2004. This is the lowest rate since 1962, as a result of an effective policy by the South African Reserve Bank (Government of South Africa, 2007).

To conclude, arguably economic indicators don't give a clear image of the South African economy. Inflation is low and economic growth is rising, both positive indicators. Unemployment on the other hand is high and many people are excluded from the positive economic growth. Crime and HIV/AIDS pose a significant threat to the South African economy. HIV/AIDS impacts on the productive population, lowering productivity and economic growth. Crime lowers trust in the economy, which lowers the investment levels. It furthermore has a negative impact on foreign investment and tourism, which are important sources of income. The South African government is working hard to reduce crime, however this is a difficult task and crime rates are decreasing only slowly (Netshitenzhe and Chikane, 2006).

2.1.2 Agriculture

(a) General Structure

Agriculture is an important sector, although the primary agricultural sector accounts for only 2.7% of GDP (in 2005). Another 9% of GDP is accounted to the secondary agricultural sector² (NDA, 2007a). A lot of people are employed in the agricultural sector in 2001; about 6% of the South African active labour force is employed in commercial agriculture and 3.3% in subsistence agriculture. A lot of people however are employed in the informal economy, which makes it difficult to say how many workers are employed in the total agricultural sector (Devey et al., 2003).

In 2002 there were 45,818 commercial farming units, compared to 60,938 in 1996. On the other hand, in that same period the total volume of agricultural production has risen by 6%, indicating a rise of production per farm

² The secondary agricultural sector is the sector that uses inputs from the primary agricultural sector to produce new products.

(Agricultural Statistics, 2007). The sharp decline in the number of commercial farms reflects closures and liquidations as some farmers were squeezed out of the market as a result of costs increasing faster than income, and many farmers increasing the scale of production by means of mergers in order to maintain profits. The decline in the number of farmers also follows international trends where the top 30% to 40% of farming operations are getting bigger and more productive (StatsSA, 2007). It is not clear if it were the smaller farmers that have stopped farming.

Export of agricultural products is important for South Africa; it was a net exporter until 2003. Maize, wheat, cane sugar, fruit, vegetables, cotton and tobacco are important agricultural export products. From 2004 imports have overtaken exports. Important import products are rice, wheat, meat, soybeans and palm oil (Agricultural Statistics, 2007). In 2005 about 5% of total imports consisted of agricultural products. The share of agricultural products in exports has always been a little higher; it was around 8% in 2005 (Agricultural Statistics, 2007).

(b) Tomatoes

Tomatoes are commonly grown by subsistence and resource poor farmers in South Africa, but are also grown on large-scale commercial farms (NDA, 2007b). It is widely used as a fresh vegetable and in the form of an onion-tomato amaranth stew to supplement the local staple diet of maize meal. As a result, it is one of the main vegetables used for hawking by small-scale entrepreneurs in the informal sector (NDA, 2007b).

In 2006 South Africa produced an average of 650,000 tonnes of tomatoes with a value of 1.3 billion Rand (€141.6 Million). The total area under tomatoes for the 2006 season was estimated at 6,830 ha (NDA, 2006).

The main tomato distribution channels are fresh produce markets, informal markets and the local tomato industry processors. A large part of tomatoes are sold fresh and about 200,000 tonnes of tomatoes are processed. Tiger Brands is the larger player on the processing market, accounting for 75% of total processing (Louw et al., 2004).

Tomatoes are subject to large seasonal price fluctuations, which means that there is a high price risk. When tomatoes are in season (August and January), prices drop to about 1,700 Rand per ton. However outside these periods prices can climb up to 4,300 Rand per ton (NDA, 2006).

2.1.3 Retail sector

The modern retail sector in South Africa has been in existence for many years, however rapid expansion was observed during the 1990's. Before the 1990's supermarkets were niche markets that were places to shop for high and

upper middle-income consumers only. Those supermarkets were primarily located in urban centres. Since the 1990's supermarkets have spread from their urban niche to smaller towns and townships (Louw et al., 2004).

The major supermarkets involved in food retail in South Africa are Pick 'n Pay, Shoprite, Spar and Woolworths (Louw et al., 2004). In 2004 Shoprite and Pick 'n Pay were the biggest supermarkets taking into account the retail banner sales (Figure 2). SPAR also has a considerable market share, the other supermarkets have considerable lower retail banner sales (Planet Retail, 2006). According to Weatherspoon & Reardon (2003), the formal sector, mainly the supermarkets, consists of 2% of all stores and handle about 50-60% of food retail in South Africa.

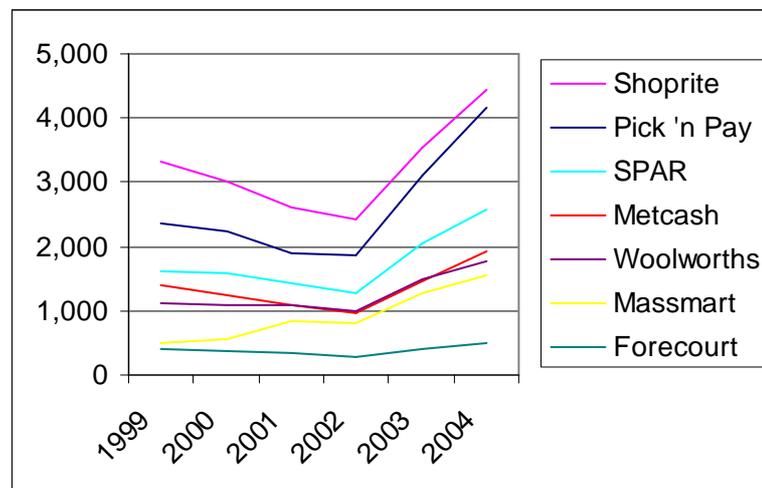


Figure 2: Retail banner sales (USD MI)

Source: Planet Retail, 2006

2.1.4 Procurement systems

Procurement systems are the systems retailers use to buy products from wholesalers, processors, and farmers, and that wholesalers or processors use to buy from each other and from farmers (Regoverning Markets, 2007). In the next section the procurement systems of the four main supermarket chains will be discussed.

(a) Pick and Pay (Source: Corb, 2006. Pers. Comm.)

Pick 'n Pay has stores in urban as well as in rural areas, however the focus is on the stores in urban areas. Most profit is made in these areas. Initially most fresh fruits and vegetables were procured from the different fresh produce markets (FPM) in South Africa, but the quality that was offered declined. Nowadays most fresh fruits and vegetables are procured from about 1,000 contracted farmers and FPM's are only used for emergencies and procurement for low quality stores in rural areas and city centres. For fresh goods Pick 'n Pay

makes use of regional distribution centres in Cape Town, Durban, Port Elizabeth and Johannesburg. For other goods there are several decentralized distribution centres. The majority of goods are already packaged and ready for the supermarket shelves.

(b) Shoprite / Checkers (Source: van Deventer, 2007. Pers. Comm.)

Freshmark, the procurement arm of Shoprite/Checkers, does procurement of fresh fruits and vegetables. The Freshmark office started 15 years ago, at that time 70% of fresh fruits and vegetables were procured from the different FPM's in the country. In line with national trends, Shoprite is also trying to get out of the FPM sector. As FPM's quality is declining, there is no consistency in supply and a basis level of food safety cannot be guaranteed.

Freshmark procures from about 700 suppliers. Products are supplied to 480 Shoprite/ Checkers stores. There are six distribution centre branches that have their own team of buyers: Centurion, Durban, Cape Town, Port Elizabeth, Bloemfontein and Polokwane. Nowadays only 10% of the products are procured from FPM's.

(c) SPAR

The SPAR Group operates 6 distribution centres that supply goods and services to 788 SPAR stores in South Africa. The distribution centres mainly supply shops in urban areas; however for stores in remote rural areas it is possible to procure fresh fruits and vegetables locally (SPAR, 2007).

SPAR is very involved in the local markets, since stores can procure locally if necessary or desired, however producers must be approved first (Louw et al., 2007). There are many cases where SPAR stores assist smallholders, for example the Thohoyandou-case. Smallholders are assisted in meeting the requirements, including provision of credit and training so as to enhance production. In return SPAR is ensured of a steady flow of fresh products (Louw et al., 2004).

(d) Woolworths (Source: Ferreira, 2006. Pers. Comm.)

Woolworths stores sell high quality products, therefore mainly to high-income consumers. Since consumers are willing to pay higher prices, fresh fruits and vegetables will be imported if local supply is low. For national procurement a centralised procurement system is put in place. There are five national buying centres; these are located in Cape Town, Durban, Port Elizabeth, Johannesburg and Nelspruit. Woolworths only procures from farmers through verbal contracts. They do not use spot buying and FPM's, because those sources are considered too risky.

2.2 Regions of study

The regions of study in this research are Limpopo and Mpumalanga, they will be introduced in the following section.

2.2.1 Limpopo

Limpopo is located in the Northern region of South Africa. It shares borders with three countries, namely Botswana to the west and northwest, Zimbabwe to the north, and Mozambique to the east. This province furthermore shares borders with the province Gauteng, which is the major consumption hub in the country (see Figure 1). The size of this province is 123,910 km², which is 10.2% of the country's total land area (LDA, 2005).

Limpopo has 3,123,000 inhabitants, which is 12% of the South African population. The percentage of Africans living in this province is much higher than the national average; 97% are black Africans and 2.5% is white (Agricultural Statistics, 2007). Life expectancy at birth was 54.4 in 2002 (Dorrington et al., 2002).

There are three different climatic regions in the province. These are the Lowveld (arid and semi-arid), the Middleveld and the Highveld (semi-arid) and the escarpment region (sub-humid) with rainfall in excess of 700 mm per year. The most limiting resource in the province is water (LDA, 2007).

Limpopo is the poorest province in the country; in 2004 the Gross Geographic Product (GGP) per capita was only R8044 (876 Euro), compared to the national average of R21,666 (2360 Euro) (Luüs, 2003). However it has the highest economic growth; in 2004 the growth rate of GDP in Limpopo was 6.3%, while the national economy average was 2.8% (LDA, 2007). Limpopo has a very high unemployment rate; it was 34% in 2005 (GHS, 2006).

Limpopo has a high potential for further economic growth, because of the abundance in natural resources, the good infrastructure and the access to South African markets, but also the access to other Southern African countries' markets (Sippo, 2006).

Agriculture is a very important sector for Limpopo; it produces 33% of South Africa's oranges, 90% of South Africa's tomatoes, 65% of South Africa's mangoes and 60% of South Africa's avocados. Other important crops are bananas, papayas, litchis, tea, macadamia nuts, pecan nuts, cotton and sorghum (Sippo, 2006).

The number of commercial farming units is declining from 7,273 in 1996 to 2,915 in 2002 (Agricultural Statistics, 2007). Irrigation is needed for about 137,000 hectares of which 58,000 hectares are held by black small-scale farmers (LDA, 2007). Agriculture is not the only important sector; other important sectors are tourism, forestry and mining (Sippo, 2006).

2.2.2 Mpumalanga

Mpumalanga is located in the North East of South Africa, sharing international borders with Mozambique and Swaziland, and provincial borders with Gauteng, Limpopo, Kwazulu Natal and Free State (see Figure 1). The province covers 79,490 km², which is 6.5% of the total land area of South Africa (MDA, 2005).

Mpumalanga has 79,490 inhabitants, which is 7% of the South African population. Of the total population in Mpumalanga, 6.5% is white and 92.4% are black Africans (GHS, 2006). Life expectancy at birth was 49.5 in 2002 (Dorrington et al., 2002).

There are two distinctive climatic regions in Mpumalanga. The first region, the Highveld, has cold winters and moderate summers. The second region, the Lowveld has mild winters and a subtropical climate. There is mostly summer rainfall in the form of heavy thunderstorms. Annual rainfall is between 500 and 1600 mm (MDA, 2007).

The growth rate of GGP in Mpumalanga was of 3.2% (2004), which is a little higher than national average of 2.8%. The per capita GGP is R24,777 (2,699 Euro) (MDA, 2007).

In 2005 24.8% of the total economic active population was unemployed. This is a relatively low number; the unemployment is lower only in Gauteng (23.6%) and the Western Cape (20.6%) (GHS, 2006).

Mpumalanga is producing 15% of total output in South Africa (GCIS, 2007). The different climatic make it possible to produce a variety of products, both summer and winter. Important products include sugar cane, sunflower seed, sorghum, potatoes, onions, cotton and maize. Farmers are mostly using dry farming land. Irrigation is mainly used in the Loskop Dam area near Groblersdal and in the Lowveld area adjacent to the Crocodile and Komati Rivers (Binedell and Muller, 2003). The decline in commercial farming units is smaller than in Limpopo, from 5,104 units in 1996 to 4,675 in 2002 (Agricultural Statistics, 2007).

2.3 Conclusion

South Africa is a diverse country, since it can be considered both a developed and a developing country; economic indicators do not give a clear picture. The two provinces used in this study reflect this diversity. Limpopo is the poorest province in the country; it has the lowest GGP. Mpumalanga has a much higher GGP and economic growth is above national average.

In the next chapter the development of the supermarket-market in South Africa will be discussed, certainly the diversity will also have its effect on the supermarket-market.

3. Supermarket development and its drivers

In this section the changes in the modern retail sector in South Africa will be discussed, including the effect these changes had on producers in South Africa.

3.1 Background

The retail sector in developing countries is restructuring into a modern system (Weatherspoon and Reardon, 2003). The forces that drove this restructuring are divided into three parts. The first is a change in consumer demand, second is Foreign Direct Investment (FDI) and third is modern procurement system technology. These three forces are responsible for the profound changes that are observed in developing country markets; changing consumer demand formed the need for a changing retail sector, FDI provided the capital in developing countries to invest in the retail sector and modern procurement system technology provided the tools to make these changes possible (Weatherspoon and Reardon, 2003; Reardon and Barrett, 2000; Regmi and Gehlhar, 2005). Figure 3 will be used as a framework in this discussion, changing consumer demand will be discussed in section 3.2, FDI in section 3.3 and section 3.4 will deal with modern procurement system technology.

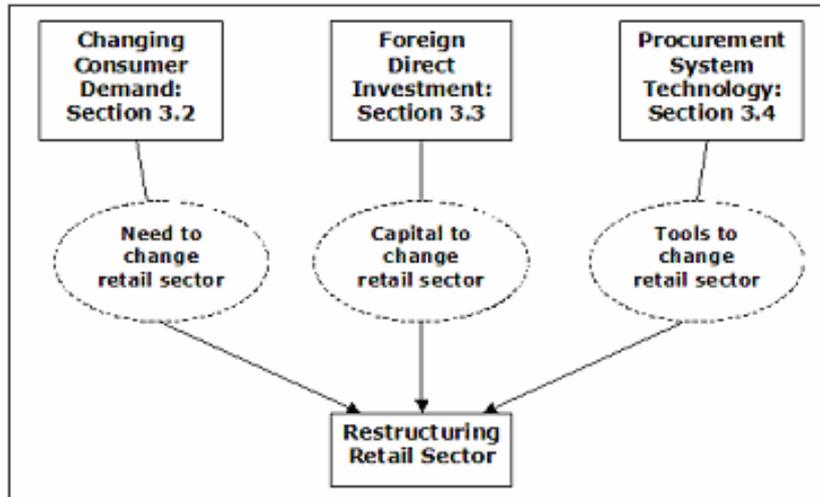


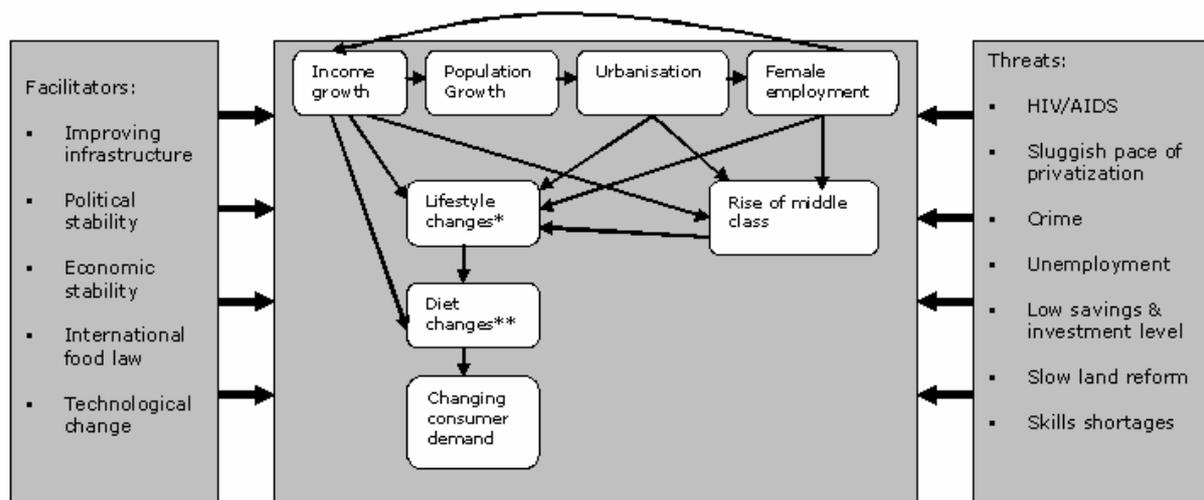
Figure 3: The forces that changed the retail sector in developing countries

Source: Weatherspoon and Reardon, 2003; Reardon and Barrett, 2000; Regmi and Gehlhar, 2005

3.2 Consumer Demand

Changing consumer demand is claimed to be the leading force that drove supermarket development. Convenience, food safety and health are becoming important issues for consumers, also in developing countries (Regmi and

Gehlhar, 2005). In Figure 4 the drivers of changing consumer demand are shown, including the way these drivers are related. The left most column shows the facilitators of this process, whereas in the rightmost column the most important threats are shown; facilitators are processes that have a positive effect on changing consumer demand, however the threats mentioned can form a serious negative effect. In the following section most of these drivers are discussed and applied to the situation in South Africa. Furthermore the relation between the drivers will be discussed.



* Lifestyle changes: Consumers buy fridge, car, microwave and have less time to cook and shop.

** Diet changes: rising demand for food safety, processed food, convenience, healthy foods, organic products etc.

Figure 4: The drivers of changing consumer demand in developing countries

Source: Reardon and Barrett, 2000; Regmi and Gehlhar, 2005; Weatherspoon and Reardon, 2003; and Euromonitor, 2006

3.2.1 Income growth

Average income has been rising in South Africa (

Table 1). In the first years of the new millennium, the average GDP growth rate in South Africa was higher than in high, middle and low-income countries. In the years thereafter middle income and low-income countries showed a higher growth rate than South Africa, although the growth rate in South Africa was still higher than high-income countries.

Table 1: GDP Growth (annual)

GDP growth (annual %)	2000	2001	2002	2003	2004	2005
High income	3.68	1.14	1.42	2.11	3.36	2.78
Middle income	5.55	2.94	3.66	5.15	7.22	6.33
Low income	3.90	4.72	3.48	7.04	7.43	7.52
South Africa	4.15	2.74	3.69	2.98	4.47	4.90

Source: World Bank, 2006

The relationship between changing consumer demand and rising income levels has often been described. Bennett's law states that as income rises, a disproportionate growth in demand for dairy, meat, horticultural, and processed grain products is observed, as compared to the demand for unprocessed staple foods (Weatherspoon and Reardon, 2003). On the other hand Engel's law, which says that the share of food spending in total consumption decreases as income rises. Wealthier consumers spent relatively more money on more expensive items such as health care, energy and recreation (Regmi and Gehlhar, 2005). As income rises the proportion of total income spent on food decreases, but consumers are demanding more luxury products. Therefore a shift is observed from buying staple products at traditional markets to more luxury products at supermarkets (Traill, 2006).

3.2.2 Urbanisation & Female employment

Although South Africa is not as urbanised as the average more developed regions, the importance of cities is growing. From 1990 until 2005, urbanisation has risen by 7.3%, whereas in the same period urbanisation in more developed regions has grown by only 2.9% (Table 2).

Table 2: Rate of urbanization in more and less development regions and South Africa

	1990	1995	2000	2005
More developed regions:				
Total population (x1,000)	1,148,572	1,173,983	1,193,354	1,211,265
Percentage Urban	71.2	72.3	73.2	74.1
Percentage Rural	28.8	27.7	26.8	25.9
Less developed regions:				
Total population	4,130,947	4,518,369	4,892,218	5,253,484

Percentage Urban	35.2	37.7	40.3	42.9
Percentage Rural	64.8	62.3	59.7	57.1

Table 2 continued

South Africa:				
Total population	36,877	41,894	45,610	47,432
Percentage Urban	52.0	54.5	56.9	59.3
Percentage Rural	48.0	45.5	43.1	40.7

Source: World Bank, 2006; UN, 2006

Households in urban areas have different lifestyles, compared to households in rural areas: (1) in urban areas a higher percentage of women is working outside the home, (2) urban households on average have a higher income than rural households and (3) people in urban areas are more mobile (Neven et al., 2006).

Urbanisation and female employment are closely related in driving the changes in consumer demand, because both developments increase the opportunity cost of time; in urban areas usually both men and women are working outside the home, so there is less time available to cook and shop. This leads to an increasing demand for convenience products and processed foods; products that are typically found in supermarkets (Traill, 2006). Another relation between urbanisation and the rise of the importance of supermarkets is the fact that most supermarkets are originally in urban areas (Weatherspoon and Reardon, 2003).

3.2.3 Middle Class

The rising income levels lead to a rising middle class; the share of the population that has a relatively higher income is growing (Reardon et al., 2006). According to economic theory a middle class is necessary for sustainable long-term economic growth (Research Surveys, 2005). This group is increasingly demanding higher quality products, availability of products all year round, higher quality and consistency and has a higher willingness to pay (Vorley, 2003). One of the trends observed in middle class consumers is the rising possession of durable goods like refrigerators, microwaves, telephones and cars. This changes the way consumers shop, cook and eat (Senauer and Goetz, 2003). Therefore changing lifestyles have an effect on consumer demand, which in turn changes the retail sector.

Black Diamonds (Source: Research Surveys, 2005)

The following case will illustrate the changes in lifestyles that have changed consumer demand and in turn triggered changes in the retail sector. Black Diamonds are a so-called new black middle class in South Africa. This black middle class is mostly responsible for the present economic growth in South Africa. GDP growth has risen from 1.9% in 2001 to 5.0% in 2005, even though buying power of white South Africans is becoming stable or sometimes even slightly decreasing and the unemployment rate of black South Africans is around 40%.

Most recent figures suggest that the size of this group is about two million people (of 18 years and older), of which 1.55 million live in townships and 450,000 live in suburbs. From 1994 to 2005, the black share of:

- vehicle ownership has risen from 29% to 42%;
- microwave ownership has risen from 6% to 45%;
- ownership of fridges has risen from 45% to 65%;
- electric stoves ownership has risen from 36% to 57%;
- the black graduation rate has increased by 334% in the last 14 years; and
- blacks constituted 30% of Masters and PhD enrolments in 2005.

This doesn't mean that economic growth is caused by a general increase in wealth for all black South Africans, since the unemployment rate is 40%. Furthermore the study shows that it is not a homogeneous and undifferentiated group, because there are large differences in terms of buying power, aspirations and consumption patterns. It is generally thought that "buppies" (a subgroup of the Black Diamonds that drive flashy cars and wear designer labels) cause most of the economic growth. But this groups only comprises 100 000 to 250 000 people (depending on one's definition) - not enough to fuel this growth. Another misconception about Black Diamonds is that as they obtain wealth, they move from the townships to the suburbs. The Black Diamond study shows some do and others don't want to.

As is said before, the characteristics of all Black Diamonds are not the same; it is a very divers group. The largest part of the Black Diamonds consists of young people just starting out. They do not contribute the biggest part to the welfare of the group, however this group has a high potential and a lot of growth is to be expected from this group in the future.

The subgroup that contributes most to the buying power of the total group are the 'Establisheds', they are 35 to 49 years old, married, with school-going children, the wealthiest and best educated. This group consists of 780,000 people (39% of the Black Diamonds), contributing 58% of the Black Diamonds buying power or R75 billion. The growth in welfare can therefore not only be attributed to young, starting individuals.

Culture is very important for a large part of the group and a lot of Black Diamonds have a strong pull towards their roots. Therefore a large part of this group will stay in the townships. It is expected that this group will drive developments in the areas that were formally underdeveloped, for example the development of infrastructure, like roads and electricity. The Black Diamonds that stay in townships will also drive supermarket development in those areas, for it is this base of middle-class consumers that are needed to establish supermarkets (Reardon et al., 2006).

3.3 Foreign Direct Investment

In developing countries FDI is a very important driver for the rise of supermarkets. FDI provides the capital that is needed to invest in developing country markets (Reardon et al., 2005). Liberalisation of developing country markets opened up the flow of FDI to those countries and spurred the rate of supermarket development (Regmi and Gehlhar, 2005). In the study of Traill (2006) was found that FDI is important for increasing the share of supermarkets in total food purchases.

South Africa was the first country in Africa to develop a significant supermarket-market, without FDI from developed countries; Africa was considered to be a too risky environment for investing. However the rise of supermarkets took place at a significant pace. When markets in South Africa became more saturated, South African chains found their ways into other countries in southern Africa and later on eastern African countries (Reardon et al., 2003). South African companies are the only investors in southern and eastern Africa (Weatherspoon and Reardon, 2003).

3.4 Modern procurement system technology

Consumers are demanding higher quality and food safety levels of food products. Traditional markets often lack these features, since traditional chains are long and fragmented and traceability is usually impossible. In order to increase quality and food safety levels, supermarkets need to improve their procurement systems (Reardon et al., 2003).

In the 1990's low and middle-income countries saw a rapid increase of agroindustrialisation. Agroindustrialisation consists of three related sets of changes (according to Wilkinson (1995) in Reardon and Barrett, 2000): "(1) the growth of agroprocessing, distribution, and farm input provision activities off-farm, undertaken by so-called "agroindustrial firms"; (2) institutional and organisational change in the relation between agroindustrial firms and farms, such as increasing vertical coordination; and (3) concomitant changes in the farm sector, such as changes in product composition, technology, and sectoral and market structures". Agroindustrialisation therefore comprises a series of changes that covers the whole chain from farm to table.

Agroindustrialisation provided the tools to shape the procurement systems of supermarkets. In this process, there are some important features, these are: (1) grades and standards; (2) improvement of logistics; (3) centralisation of procurement; (4) contracts; and (5) preferred suppliers. These five features will be discussed in the following sections. Supermarkets that improve their procurement system, taking into account these five features will be capable of improving the level of food safety and quality (Reardon et al., 2006; Ruben et al., 2006).

3.4.1 Grades and standards

Grades and standards are the most important tool for improving quality and food safety; they serve as a system of coordination to prevent market failure. *Grades* and *standards* are described as: "defined parameters that segregate similar products into categories and describe them with consistent terminology that can be commonly understood by market participants". In particular, *standards* are: "rules of measurement established by regulation or authority" and *grades* are defined as: "a system of classifications based on quantifiable attributes" (Giovannucci and Reardon, 2000). A common system and terminology have several benefits, they:

- Make it possible to buy product that one has not seen;
- Improve the incentives for quality and safety;
- Make market information meaningful;
- Facilitate price/quality comparisons;
- Reduce the risk of deception and fraudulent marketing;
- Enable diverse market mechanisms such as futures trading, commodity exchanges, inventory credit or warehouse receipts schemes, and letters of credit; and
- Facilitate resolution of disputes regarding quality and/or composition of shipped products (Giovannucci and Reardon, 2000).

Public grades and standards

There is a distinctive difference between public and private grades and standards, because public and private sector have different reasons to apply grades and standards. *Public standards* are standards set by governments and other public organisations such as the World Trade Organisation (WTO). The reason for governments to set standards is mainly to protect public health, to guarantee at least a certain quality and health level of the products that are sold in that country. Therefore the government sets minimum requirements for products to enter a country, and this is mainly checked at the points of entrance of a country (Henson et al., 2000).

Until recently grades and standards were mainly seen as a public domain, not as something that was of any importance to the private sector. This is caused by several factors: (1) historically, standards have arisen with rise of markets for commodities, often as public standards to reduce transaction costs and increase efficiency, allowing expansion of trade. (2) Standards were viewed as public goods necessary in the presence of imperfect and asymmetric information that cause market failure. (3) The recent debates related to the WTO have focused attention on standards as potential non-tariff trade barriers erected by governments to block imports competing with domestic production (Reardon and Farina, 2001). Therefore grades and standards were not seen to hold any importance for the private sector.

Private grades and standards

But grades and standards are not just an issue for governments and other public institutions; for the private sector grades and standards are a very important and a much-used tool. *Private standards* are defined as: "incentives by the private sector to assure quality and safety in a fiercely competitive market" (Reardon et al., 2001).

A reason for multinational agrifood firms to imply grades and standards is to make their operations compatible across markets. Grades and standards furthermore serve to distinguish their quality and ability to coordinate in the given host market, which strengthens the position of agrifood firms (Reardon et al., 2001). These firms or associations use grades and standards to specify quality and safety standards for each point in their operation in order to:

- Reduce coordination costs;
- Meet or exceed quality and safety requirements in the range of markets in which they participate;
- Create a reputation of quality assurance among consumers and other firms;
- Complement sub-contracting mechanisms;

- Increase the firm or industry's flexibility to adjust to new market conditions; and
- Raise transaction costs for competitors (Giovannucci and Reardon, 2000).

Why change from public to private?

For many private organisations, the public grades and standards that were already in use didn't fulfil their needs and demands. Private organisations not only wanted to assure a minimum level of quality, they needed more. For example supermarkets want to assure to their customers that the products are produced under certain conditions (for example no child labour used, good working conditions for the producers or HACCP (Hazard Analysis Critical Control Points) during each stage of the production process). Therefore they designed their own private system of grades and standards (Reardon and Farina, 2001).

There are three reasons why private standards became more important: (1) the demand for standards to define and regulate markets grew faster than the supply of public standards and there was no harmony in the public standards. (2) Standards are not merely public goods to resolve market failures; they are strategic instruments of market differentiation and market share and niche protection by food companies. (3) Private standards have become increasingly important as tools of chain coordination, as meta-management systems (Reardon and Farina, 2001).

Grades and standards in developing countries

When exporting products to Europe, producers in developing countries have to comply with various food safety agreements, for example EurepGap, HACCP system or ISO (International Standard for Organisations) norms. These quality management systems oblige farmers to produce in a certain way (Unnevehr, 2000). On domestic markets private grades and standards are also becoming more important, not just on the export market (Reardon et al., 2001). Supermarkets in developing countries are designing quality management systems, sometimes based on European systems, but usually these are systems that comply with the national circumstances (Reardon et al., 2001). In doing so supermarkets are trying to distinguish the food sold in those stores from food sold on traditional markets (Boselie et al., 2003).

3.4.2 Improvement of logistics

In order to improve logistics in supermarket supply chains, supermarkets oblige all stakeholders in the supply chain to adopt best practice logistical technology (Reardon et al., 2003). The use of technology improves efficiency and streamlines procurement systems.

Good communication between all the actors in the supply chain is another essential part of the improvement of logistics. Communication between farm, distribution centre and supermarket must be well arranged and efficient for an efficient flow of the product from farm to store. Clear communication lowers information costs and risk of a decrease of the products involved (Vorley, 2003).

3.4.3 Centralisation of procurement

A third feature of development of modern supermarket supply chains is centralisation of procurement. As the number of stores per chain rises, it is more efficient to organise the procurement of products through a distribution centre, instead of arranging procurement per store (Boselie and Van der Kop, 2004; Johnson and Hofman, 2004). The advantage of centralised procurement is better stock management, which improves the availability of products in supermarkets (Neven and Reardon, 2004).

3.4.4 Contracts

The use of (semi) formal contracts is another way to establish more formal relationships in supermarket supply chains, and therefore another feature of developing supermarket supply chains. By having contracts with suppliers, supermarkets have more control over the flow of products; they can control the supply. It also reduces the risk of supermarkets not to have a steady supply. Regmi and Gehlhar (2005) claim that having contracts with suppliers stimulates the producer to stay with the same buyer and therefore is an incentive for producers to invest in their production.

3.4.5 Preferred suppliers

Supermarkets have a preference to procure from large commercial growers; for supermarkets this eases delivery conditions and secures a constant and reliable supply. Large suppliers usually have a better infrastructure, which ensures higher quality and better communication. This is a better guarantee to supermarkets that these growers comply with their demands (Boselie et al., 2003).

Having contracts with suppliers and preferring to procure from large commercial farmers leads to a system of preferred suppliers; supermarkets have contracts with a few preferred suppliers of the products that are sold in the stores (Reardon et al., 2006). This is the ultimate means to control the flow of products and ensure the availability of products.

To conclude, supermarket supply chains are turning into buyer driven chains, these are shorter and more regulated. Furthermore they have a higher level of governance and long-term vertical coordination between producers,

suppliers and retailers (Vorley, 2003; Boselie et al., 2003). A central issue in all these changes is the importance of consumer demands; it is important to know what the consumer wants and to satisfy these needs. Especially as markets are maturing, competition increases and supermarkets have a higher risk of losing consumers (Regmi and Gehlhar, 2005).

3.5 Producers and supermarket supply chains

3.5.1 General

The retail sector in Africa is restructuring; changing consumer demand, FDI and the availability of modern procurement system technology are slowly transforming the retail sector. As a result supermarket supply chains are turning into more efficient and streamlined buyer driven chains.

Profound changes are also observed on the producer side. Modern production methods, improved inputs (seeds, fertilizer, chemicals etc.) and available technology increased both output and quality of agricultural production (Reardon and Barrett, 2000).

However not all farmers modernised their production, some farmers continued to produce in a traditional way. Especially a lot of smallholders were not able to change their way of producing (Weatherspoon and Reardon, 2003).

There is much variation among smallholders; it is a very diverse group. However in Orden et al. (2004) three broad groups of smallholders are recognised. The first group is globally competitive and market oriented, these farmers are selling to national and international markets. The second group produces partly for home consumption, however at least a small part of their production is commercial and products are sold on the market. The last group is the most marginalised group, producing exclusively for home consumption. The ability of each group to sell to supermarkets is different. The first group doesn't require much assistance in selling to modern, restructured market channels. The ability of the other two groups however differs much. The second group may be producing a sufficient quantity to sell to supermarkets, but they might need assistance in fulfilling the other requirements of supermarkets (quality and delivering requirements for example). The last group is however not yet producing enough to exceed the subsistence level, for this group supplying to supermarkets (if desired) is still far away. This shows that there is not one way to connect smallholder farmers to modern markets.

The supermarket-market is seen as a promising sector for smallholders, it could be an escape out of poverty (FAO, 2006). But certain farm household characteristics of smallholders do not match with the demands of supermarkets. As is said in the previous section, supermarkets prefer to procure from large, commercial growers that are more able to fulfil the stringent demands of

supermarkets (Boselie et al., 2003). A lot of smallholders lack the infrastructure, capital and knowledge to be a full partner and are therefore excluded from restructuring markets (Berdegué et al., 2006).

3.5.2 Previous empirical work

In recent years market channel choice of smallholders has been given a lot of attention, and especially Latin and Central America have been the subject of research (See for example Berdegué et al., 2006; Balsevich, 2006; Flores, 2006; or Reardon et al., 2006). Many studies have been carried out in determining which factors are important in influencing market channel choice of smallholders. Reardon et al. (2006) found a correlation between plot size and specialisation and the ability to supply to supermarkets. The combination of plot size and specialisation confirm the preference of supermarkets to procure from larger farmers that are dedicated to one product. Other significant differences between smallholders that are or are not supplying to supermarkets is the level of capitalisation (owning irrigation systems and vehicles being the most important) and the distance to the main road. Farmers supplying to supermarkets have more irrigated land, have a higher probability of having a car, and are closer to the main road. These assets lower transaction costs and improve the freshness and quality of the product, which is another important factor in supplying to supermarkets. Another observation was that farmers supplying to supermarkets use more non-labour inputs like chemicals and fertiliser but on average, less labour input. This would suggest that farmers supplying to supermarkets substitute labour by increased use of non-labour inputs.

They are found to substitute labour for non-labour inputs. Factors that had no showed correlation with supplying to supermarkets are tractor or animal traction access, education and the availability of greenhouses did not play a clear differentiating role (Reardon et al., 2006).

Furthermore the effect on income was analysed. The conclusion was that supermarkets paid a higher price, but the costs for supplying to supermarket were higher. Nevertheless the net income from supermarkets was 1.75 times more per hectare, because farmers that were supplying to supermarkets had a higher yield per hectare. This result was also found by Balsevich et al. (2006); farmers supplying to supermarkets had higher production costs, but this was in turn compensated by the higher price paid by supermarkets.

Farm size is stated to be an important factor when supplying to supermarkets, as was found in Reardon et al. (2006). However not in all studies plot size is important; Berdegué et al. (2006) found no significant relationship between plot size and selling to supermarkets. Other factors that were not correlated are education, membership of a farmer's organisation and access to

credit. Access to technical assistance was an important factor in the study of Berdegué et al. (2006). Farmers supplying to supermarkets had more sources of technical assistance.

From these studies it becomes clear that there are a lot of differences between different areas; it were not always the same factors that determined market channel choice for smallholder farmers. In the following chapters it will become clear which factors are important in determining market channel choice for smallholders in Limpopo and Mpumalanga, but first the methodology of this study will be discussed in the next chapter.

4. Methodology

This study analyses the case of tomato producers in Limpopo and Mpumalanga (South Africa). These provinces are selected because most tomatoes are produced there, Limpopo has about 45% of the total production area of tomatoes and Mpumalanga has another 13% (NDA, 2007a). Furthermore both provinces are in close proximity to Gauteng, a densely populated province and major consumption hub (Louw et al., 2007). The tomato sector is chosen for this analysis, because tomatoes are the second most important vegetable produced in South Africa economy (Table 3) after sweet corn (NDA, 2006).

Table 3: Major vegetables produced in South Africa based on gross value of production

Major vegetable	Relative importance by gross value of production (%)
Sweet corn	43
Tomatoes	24
Onions	15
Pumpkins	6
Carrots	5
Green Beans	4
Cabbages	3

Source: NDA, 2006

4.1 Data source and sampling

The main data source of this study is a survey carried out by the Regoverning Markets team in Pretoria. Data about household and farm characteristics was collected from 350 smallholders in the provinces Limpopo and Mpumalanga. The data collection took place in January and February, 2007. The interviews were carried out by students of the University of Pretoria that were originally from the areas where the survey was carried out. In the months thereafter the results were entered and cleaned, before they were available for analysis.

The sample is drawn from all smallholder tomato farmers in Limpopo and Mpumalanga, based on the 2002 Agricultural Census' classification of smallholder farmers (Louw et al., 2007). A stratified random sampling technique is used. The sample is first stratified by province. Then it is stratified by market channel, either formal or informal. Within the formal channel, 50 farmers must be supplying supermarkets or greengrocers, and the other 50 must be supplying processors. Within the informal channel, half of the smallholders must be supplying to Fresh Produce Markets (FPM) and the other half to hawkers.

From the original sample of 350 farmers, a sub-set (30% of the original sample) was used for statistical analysis in this study. A high number of cases were rejected due to dubious and / or missing data.

4.2 Questionnaire design

The questionnaire contains both open and closed questions in different categories, the following categories are included in the questionnaire: (1) household demography and economy; (2) resource endowments and infrastructure; (3) access to water and irrigation; (4) social capital and community participation; (5) rural institutions and technical / extension services provision; (6) general agricultural activities; (7) tomato production; (8) tomato marketing and (9) access to restructures markets. For the complete questionnaire, see annex 1.

4.3 Data analysis

The data collected by the Regoverning Markets team will be analysed using SPSS 12.0.1 and E-Views 3.1.

In the explorative analysis the farmers were divided in two groups: those supplying at least part of their products to modern market channels (supermarkets, processors and fresh produce markets) and those that only supply to traditional market channels (open markets and hawkers on foot or with bakkies). The differences in sample means of the continuous variables are tested using independent sample T-test statistics. Categorical variables are analysed using Chi² test statistics. If mean values are significantly different at 1% level this is indicated ***, if mean values are significantly different at 5% level this is indicated ** and if mean values are significantly different at 10% level this is indicated *. Otherwise there is no significant difference assumed between the mean values of the two groups.

Initially the analysis would consist of two stages, but due to shortcomings in the data only the first stage can be carried out. In the first stage market channel choice is analysed using a probit function. The probit function is chosen, because the outcome of the probit function is a probability between two choices, either 0 or 1. In the second stage an analysis of the income function would be made, to study the differences in income of farmers in the different channels.

4.4 Model specification

The probit model is based on the model used in Berdegué et al. (2006). It is specified as follows:

$$Y(ij) = \beta(j)X(ij)+\varepsilon(ij) \quad (4.1)$$

Y indicates market channel choice of the *i*th producer; *j*=1 if the producer chooses a modern market channel and *j*=0 if the producer chooses a traditional market channel only.

The probability that farmer *i* is selling to market channel *j*=1 is represented by a function $F(x, \beta)$ where factor *x* represents the farm and producer characteristics that are hypothesised to affect market channel choice. The vector of parameter β represents the significance and the effect of changes on *x* on market channel choice. $\epsilon(ij)$ represents the error term.

The analysis will be conducted several times on a different division of the sample. In analysis 1 the sample will be divided in those farmers selling to supermarkets and those not selling to supermarkets. Since the percentage of farmers selling to supermarkets is very low, only 6% of the sample, this analysis is not highly significant. Therefore in analysis 2 the sample will be divided into a group of farmers that sells to supermarkets or processors and a group that does not sell to these two channels. The share of farmers selling to supermarkets and agro-processors in the total sample is still low, namely 9% and therefore in analysis 3 another channel will be added to this group. This channel is fresh produce markets and there is a big difference in quality demanded by this channel. However the large distance between the farmers and the fresh produce markets in Johannesburg raises a significant barrier. There are high transport costs involved in sending products to the FPM, and therefore not all farmers will be able to afford this, this factor justifies the addition of the FPM to the first group. In analysis 3 the share of the modern market channel is 25% and this is probably enough to trust the outcome of the analysis.

Market channel choice is the dependent variable in the analysis and the following variables are used as independent variables:

ACCESSYORN	Access to a pack house, 0 if no and 1 if yes;
AGE	The age of the producer in years;
AGRTRAIN	Measures if the producer has had agricultural training; agricultural training is 1 if the producer had agricultural training and 0 if not;
ARABLE	Size of arable land in hectares;
CAPINDEX	A measurement of the degree of capitalisation, 0 for a low level and 3 for the highest level;
CAR	Ownership of a car, 0 if hired and 1 if owned;
CHMARK	Farmer changed market channel in the past 5 years, 0 if no and 1 if yes;
CRED	Accessed credit for agricultural production, 0 if no and 1 if yes;
DIS	Distance from the farm to the main road, measured in kilometres;

EDU	The education level of the producer in years;
EXP	The experience a farmer has in agriculture, measured in years;
FULLTIME	Measures if the producer is a full time farmer, 0 if no and 1 if yes;
GRADETOM	Grading of tomatoes, 0 if no and 1 if yes;
HHSIZE	The size of the household, in number of persons;
HHTYPEDUM	Dummy for household type, 1 if the household is male headed, 0 if other;
HYBSEEDDUM	Dummy for the use of hybrid seed, 1 if the producer uses hybrid seeds, 0 if recycled seeds are used;
INDIRRIDUM	Dummy for individual irrigation, 1 if it is an individual system and 0 if it is shared;
LANDREFORM	Is the producer a beneficiary of land reform, 0 if no and 1 if yes;
LOCDUMEHL	Dummy variable for location, 1 if farmer is from Ehlanzeni, 0 if other;
LOCDUMMOP	Dummy variable for location, 1 if farmer is from Mopani, 0 if other;
LOCDUMVHE	Dummy variable for location, 1 if farmer is from Vhembe, 0 if other;
MEMCOOP	Membership of cooperative, 0 if no and 1 if yes;
MENTOM	Membership of tomato producer organisation, 0 if no and 1 if yes;
TABTOMDUM	Dummy for table tomato, 1 if table tomato, 0 if jam;
TECHINFO	Technical information received from extension worker, 0 if no and 1 if yes; and
TOMEXP	Experience in tomato farming measured in years;

The probit analysis will determine the effect of the variables in the analysis on the dependent variable, market channel choice. In the following section the expected signs are given and explained.

ACCESSYORN	+	Supermarkets require pack houses, therefore having access is important;
AGE	-	Older producers are expected to be less innovative;
AGRTRAIN	+	Agricultural training increases farming knowledge and is expected to have a positive relationship with selling to supermarkets;
ARABLE	+	Supermarkets prefer large farmers;
CAPINDEX	+	The tomatoes demanded by supermarkets require a more capital intensive way of producing;

CAR	+	Ownership of a car indicates that the farmer is able to afford this and is therefore richer;
CHMARK	+	If the farmer changed market channel, this indicates a strategic marketing thinking;
CRED	+	Farmers that accessed credit can invest in their production (methods) and this improves supermarket access;
DIS	-	Farms that are located closer to the main road are expected to have a better access to modern markets;
EDU	+	Education increases knowledge, to improve your way of producing and be able to sell to supermarkets;
EXP	+	Experience in farming contributes to sell to supermarkets;
FULLTIME	+	Fulltime farmers are expected to be more innovative, because all of their income is derived from farming and must therefore be profitable;
GRADETOM	+	Supermarkets require grading;
HHSIZE	-	Bigger households are more traditional;
HHTYPEDUM	+	Male headed households are expected to be most innovative;
HYBSEEDDUM	+	Producers that use hybrid seeds have a more modern way of producing and are therefore expected to have a higher share of shares to supermarkets;
INDIRRIDUM	+	Producers selling to supermarkets are expected to be more independent in their way of producing, therefore having an individual irrigation system;
LANDREFORM	-	Farmers that acquired land through a land reform program do not supply to supermarkets, because this program is only available to small farmers;
LOCDUMVHE	-	Vhembe is a district in Limpopo, since Limpopo is the poorest of the two provinces (lowest GGP), it is expected that farmers in this district are selling to traditional channels;
LOCDUMMOP	-	Same as Vhembe;
LOCDUMEHL	+	Ehlanzeni has a higher GGP, and one would expect farmers in this region to have a more modern way of producing and therefore being able to sell to supermarkets;
MEMCOOP	+	Farmers that are involved in a cooperation have more access to knowledge about how to access supermarket supply chains;

MEMTOM	+	Farmers that are involved in a tomato producer organisation have more access to knowledge about how to access supermarket supply chains;
TABTOMDUM	+	Table tomatoes are demanded by supermarkets;
TECHINFO	-	Farmers that require technical assistance are less modern and do not supply to supermarkets; and
TOMEXP	+	Experience in farming contributes to sell to supermarkets;

This chapter gave a detailed description of the analysis. The following chapter will discuss the outcome of the analysis.

5. Results

5.1 Comparison over districts

The survey is held in three different districts; 2 districts in Limpopo, namely Vhembe and Mopani and 1 district in Mpumalanga, namely Ehlanzeni. The exact location of these districts can be seen in Figure 5).

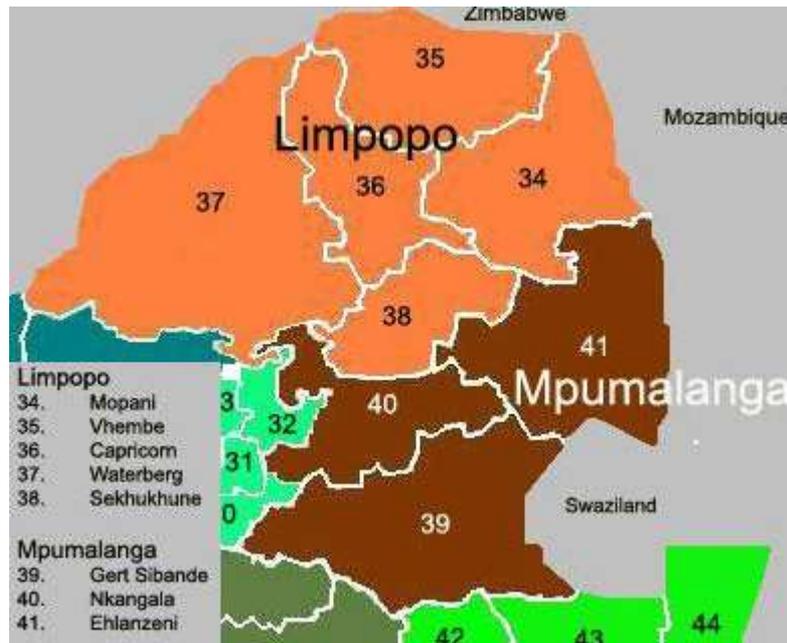


Figure 5: Districts in Limpopo and Mpumalanga

Source: Kapstadt, 2007

5.1.1 Production and income

As is said before, Limpopo is a much poorer province than Mpumalanga, according to GGP in 2004 (GGP of respectively R8,044 and R24,777). When comparing farmers in the three different regions, there are many significant differences. The first is the difference in income and production levels in the three districts (Farm income and production differ greatly between regions, as can be seen in Figure 6. The level of farm income in the districts Vhembe and Mopani (both Limpopo) is significantly higher than in Ehlanzeni. So although Limpopo is the poorest of the provinces in this study, income levels of the farmers in the sample is the highest.

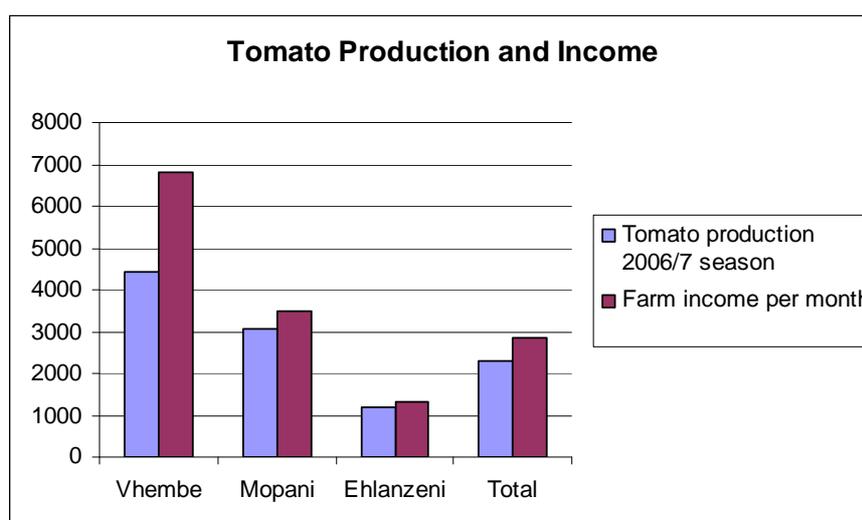


Figure 6: Tomato production and income per district

When comparing these results to the most important source of income (Table 4), one can see that farming is usually the main source of income. So the different income levels can't be explained by the fact that farmers have other main sources of income.

Table 4: Sources of income

Income source share	District			Total
	Vhembe	Mopani	Ehlanzeni	
	%			
Agriculture	63	95	69	77
Salary	0	0	12	6.2
Remittances	0	0	1.7	0.88
Business	6.3	0	3.4	2.7
Govt. grant	31	5.3	14	13

In Figure 7 the average size of arable land is shown. One would expect the size of arable land to be bigger in Vhembe, since income and production levels are higher too. However this is not the case, Average size is lowest in Vhembe, only 1.8 hectares. This indicates a more efficient way of producing, since the farmers are able to reach a much higher output level with only 1/3 of the land available to the other farmers.

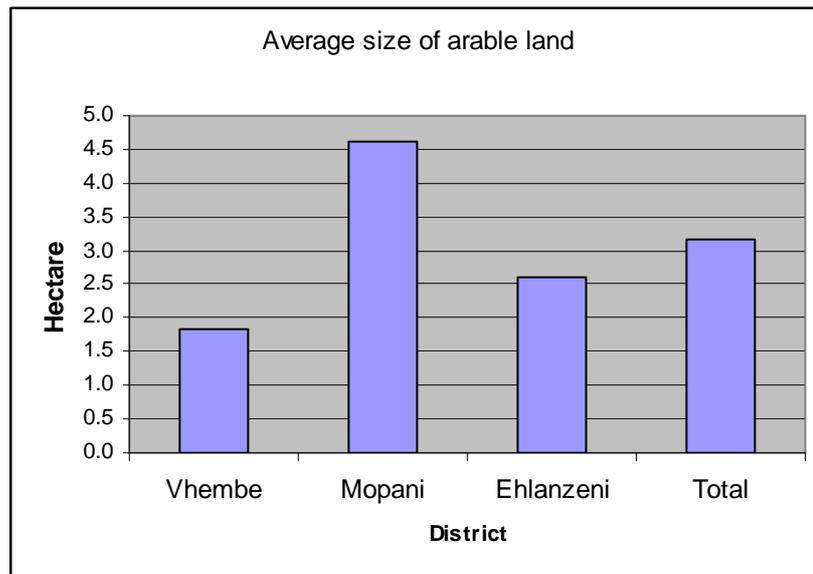


Figure 7: Average size of arable land

5.1.2 Household characteristics

Another striking observation is the percentage of female headed households in Ehlanzeni (Figure 8). More than half of the farmers in Ehlanzeni are female, compared to around 33% in Mopani and only 20% in Vhembe.

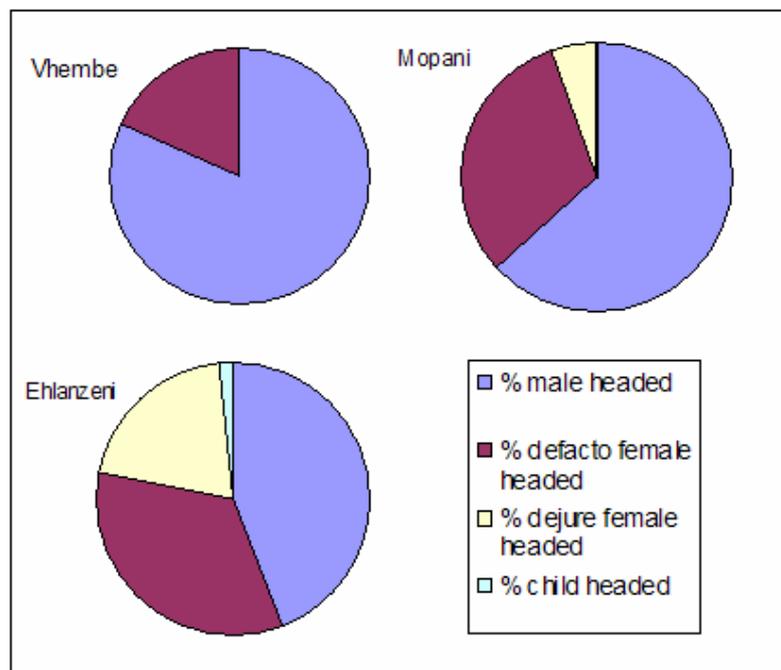


Figure 8: Type of households in districts

When comparing some other farmer characteristics, summarised in Figure 9, more significant differences are observed. Farmers in Vhembe are (on average) older, have much more experience in farming and significantly more

experience in producing tomatoes. There are no big differences in Mopani and Ehlanzeni.

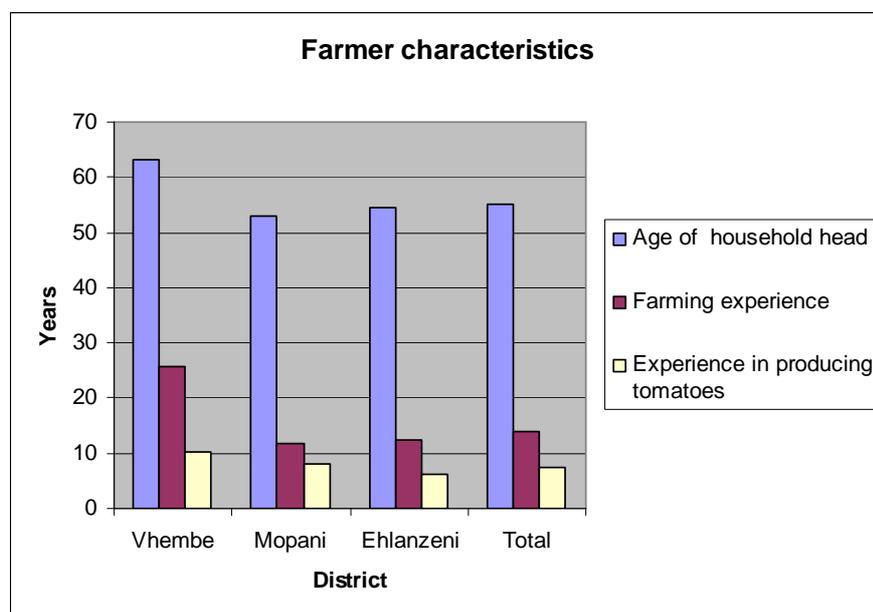


Figure 9: Farmer characteristics

5.1.3 Farm characteristics

Ownership of capital indicates a more capital intensive production in Mopani. In this district farmers have on average a higher own capital index³, compared to the farmers that have to hire these things. Of the farmers in Mopani, 55% own the tractor they use, 26% of the farmers have their own car and some even own a lorry, although this is only 2.6%. In Vhembe the percentages are a little lower, especially the share that owns a tractor. In Ehlanzeni however almost all farmers have to hire the capital they need. Relating this to the size and low income in Ehlanzeni, one could say that income in Ehlanzeni may be too low to afford own capital.

³ Capital index: the number of owned capital (car, lorry and tractor)

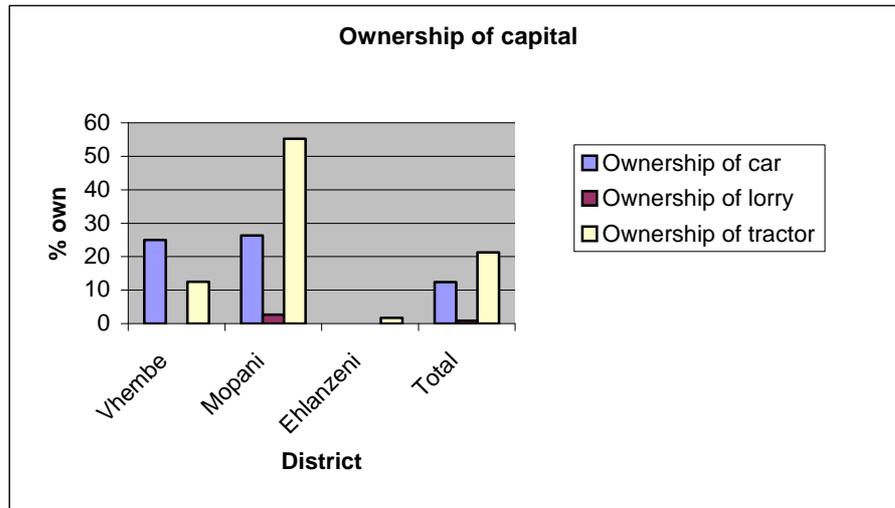


Figure 10: Ownership of capital

Furthermore there are differences in land use per district (Figure 11). “Permit to occupy” (PTO), which is very important in Ehlanzeni and Mopani, is of minor importance in Vhembe. The dominant type of land in Vhembe is inherited land, which is less important in Mopani and not prevalent in Ehlanzeni. As confirmed in literature, owning your land is an important stimulus to invest in it. Farmers that own land are known to do long term investments, for they are sure the land will be theirs for a long time (Slangen, 2004). These investments improve the quality of land and increase both quality and quantity of output.

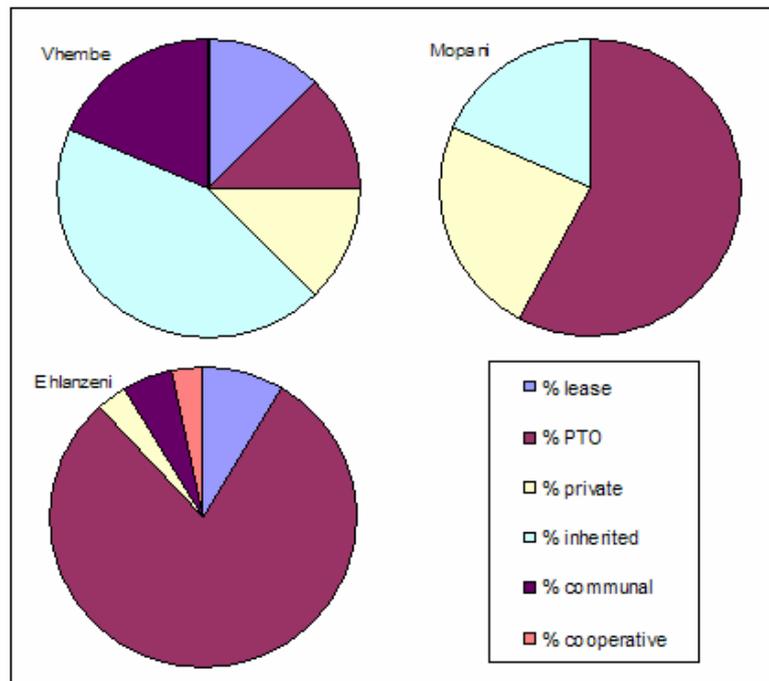


Figure 11: Land use in districts

The use of greenhouses is remarkably absent in the whole sample, there are no farmers that use tunnels. The effect of producing tomatoes in a greenhouse can be significant, as can be seen in Figure 12 and Figure 13.



Figure 12: Tomato plants in a tunnel

Figure 13: Plants in the open air

Figure 12 shows plants that are grown in a tunnel, as can be seen the plants look strong and healthy, and what is most important, the plants are tall. The plants in the Figure 13 are grown in the open air, the age of the plants is about the same. The plants grown in the open air are small and look dried out by the strong sunshine.

The two most dominant tomato types are fruit (or jam) tomatoes and table tomatoes. Fruit tomatoes are mainly produced by traditional farmers and table tomatoes are mainly produced by more modern farmers, because these type of tomatoes are usually demanded by supermarkets. In Vhembe and Ehlanzeni fruit tomatoes are the most produced type, indicating a bias to traditional way of producing. In Mopani table tomatoes are the most produced type. As is said before, table tomatoes require a more capital intensive way of producing. Ownership of capital was the highest in Mopani (Figure 10), this confirms a relationship between type of tomatoes and capital.

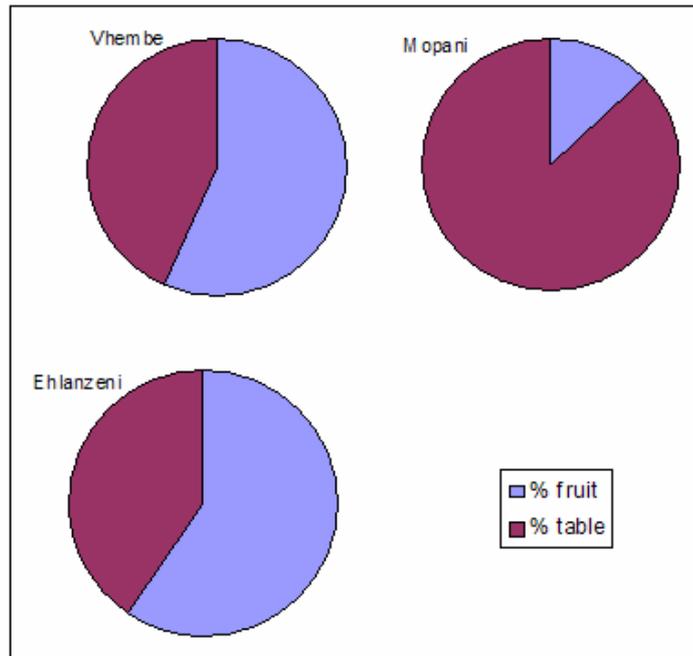


Figure 14: Type of tomatoes

5.1.4 Dominant market channels

Based on the previous results, one will expect different market channels used in the different districts. Figure 15 shows the percentages of farmers that sell to supermarkets, agro-processors or FPM. In Mopani most farmers sell to fresh produce markets, furthermore this district has the highest share of farmers selling to a supermarket; 16% of all the farmers in this district sell to a supermarket.

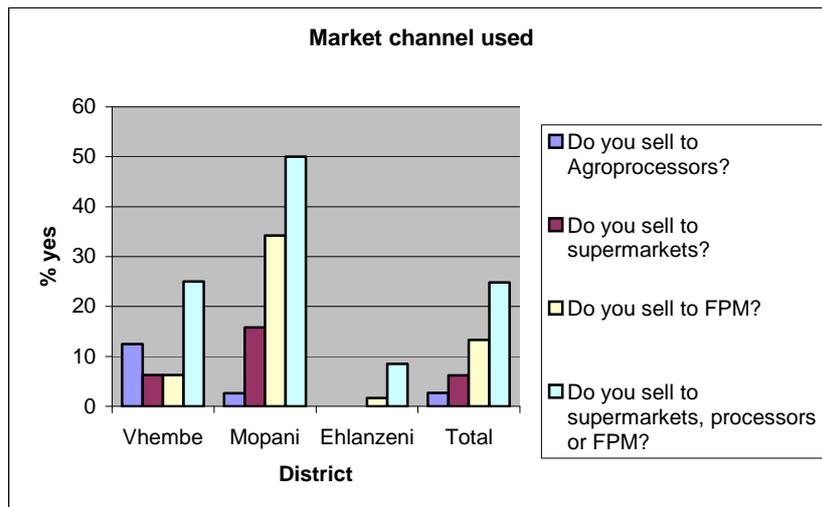


Figure 15: Market channels used in the districts

When looking at the total share of farmers selling to a modern market channel, 50% of producers in Mopani is involved in this. Vhembe has a relatively high share of farmers selling to agro-processors, this can be explained by the relatively high number of processor plants in this district (Tiger Brands, 2007). In Ehlanzeni the share of farmers selling to a modern market channel is low, only 8.5%.

An interesting observation is the relation between gender and market channel choice (Figure 16). In Vhembe it are only the male headed households that sell to a supermarket. In Mopani both male headed and other households sell to supermarkets, although the male headed households have a higher share. In Ehlanzeni there is not much difference between the different households, although other households have a slightly higher percentage.

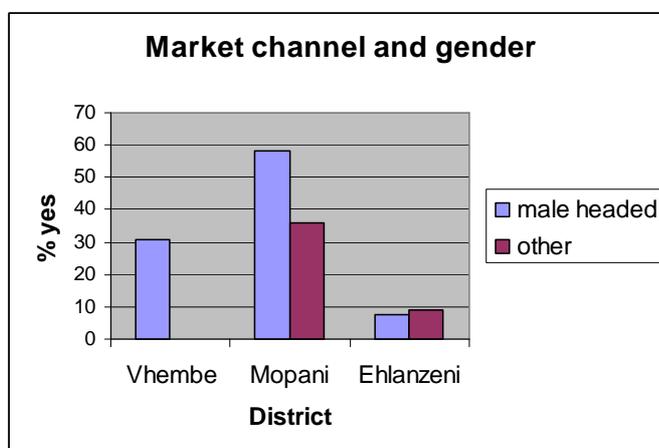


Figure 16: The percentage of farmers selling to supermarkets

Furthermore market channel choice of the farmers that did and did not access credit are compared (Figure 17). The difference between both groups is striking, In both Vhembe and Mopani 100% of the farmers that accessed credit is selling to a modern market channel, compared to much lower sales to modern market channels of the group of farmers that did not access credit. This indicates a relation between market channel choice and credit.

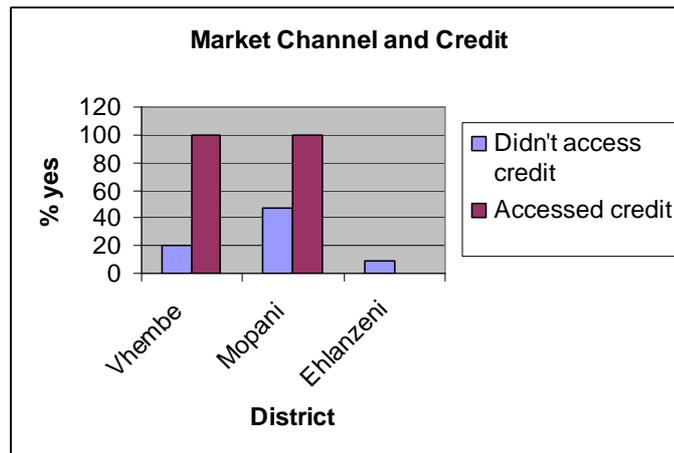


Figure 17: Market channel and credit

5.1.5 Conclusion

Results until now have shown that farmers in Vhembe have a higher average income. Nonetheless farming in Mopani looks more modern, with a higher capital index, the modern type of tomatoes and a higher share of modern market channels.

The next section continues on the topic of market channel choice; exploring the differences between these channels.

5.2 Comparison over market channels

Table 5 summarises some farm and household characteristics of the producers in the sample. The farmers are divided into farmers selling only to a traditional market channel (hawkers and open markets) and farmers selling to a modern market channel (supermarkets, processors and fresh produce markets).

Table 5: Characteristics of tomato farmers according to market channel

Variable		Modern channel		Traditional channel		Total		EV	t	Sig	
		Mean	CV	Mean	CV	Mean	CV				
Continuous variables											
Age of household head	Years	58	15	54	12	55	13		1.3	0.19	ns
Education level of household head	Years	7.7	3.7	8.0	3.6	7.9	3.6		-0.35	0.73	ns
Size of household	Number	5.0	3.2	6.8	3.0	6.4	3.2		-2.8	0.01	***
Distance to the main road	Kilometres	7.8	13	4.9	7.8	5.6	9.5	na*	1.1	0.28	ns
Number of years farming	Years	15	11	14	9.3	14	9.7		0.52	0.60	ns
Farm size	Hectare	4.7	4.0	3.7	3.5	4.0	3.6		1.3	0.21	ns
Size of arable land	Hectare	4.0	3.9	2.9	2.6	3.2	3.0	na	1.4	0.17	ns
Farm income per month	Rand	4,250	5,735	2,377	3,484	2,841	4,207	na	1.6	0.11	ns
Tomato experience	Years	10	11	6.4	5.8	7.4	7.6	na	1.8	0.09	*
Tomato production	Kilos	2,834	2,737	2,108	2,557	2,288	2,609		1.3	0.20	ns
Total income in from tomato production	Rand	6,808	6,856	2,755	4,529	3,760	5,459	na	2.9	0.01	***
What percentage is grade 1	Number	62	19	55	18	57	19		1.8	0.08	*
What area is under tomatoes	Hectare	2.2	2.8	1.2	1.8	1.5	2.2	na	1.8	0.09	*
Part of tomato area that is under irrigation	Hectare	2.2	2.4	1.2	1.8	1.5	2.0		2.2	0.03	**

* na = not assumed

Table 5 Continued

		Modern channel Mean	Traditional channel Mean	Total Mean	Chi ²	Sig	
Categorical variables							
Type of household	% male headed	71	51	56	3.9	0.27	ns
Agricultural training?	% yes	14	40	34	6.2	0.01	***
Full time farmer	% fulltime	86	85	85	0.02	0.90	ns
Beneficiary of land reform?	% yes	34	27	28	0.75	0.39	ns
Ownership of car	% own	25	8.2	12	5.5	0.02	**
Ownership of lorry	% own	3.6	0.00	0.88	3.1	0.08	*
Ownership of tractor	% own	29	19	21	1.2	0.27	ns
Access to irrigation?	% yes	100	95	96	1.4	0.24	ns
Type of irrigation	% own	43	27	31	2.5	0.12	ns
Membership of cooperative?	% yes	36	71	62	11	0.001	***
Membership of tomato producer org.?	% yes	43	25	29	3.4	0.07	*
Access to pack house?	% yes	7.1	18	15	1.8	0.18	ns
Technical info from extension worker?	% yes	79	85	83	0.57	0.45	ns
Accessed credit for production?	% yes	11	7.1	8.0	0.38	0.54	ns
Type of tomatoes produced	% table	71	52	57	3.3	0.07	*
Type of tomato seeds used	% hybrid	89	87	88	0.10	0.76	ns
Do you grade your tomatoes?	% yes	96	93	94	0.44	0.51	ns

5.2.1 Respondent and household characteristics

The average age of farmers is 55 years, there is no significant difference between the two groups. Of the total sample 56% are male headed households. The farmers have an average education level of 8 years. It is remarkable that the farmers not selling to modern market channels have a significantly higher level of agricultural training; 40% have had agricultural training, compared to only 14% of the farmers that sell to modern market channels. This outcome is counterintuitive and difficult to explain. The average size of the households of the two groups is significantly different, those farmers selling to a modern market channel have an average of five household members and those only selling to traditional channels have an average of 6.8 members. This indicates a modern perception of the farmers that sell to modern market channels, as a reducing number of children is usually perceived as increased modernisation (Potts and Marks, 2001).

5.2.2 Farm and production characteristics

Farmers that are producing for a modern market channel are further from the main road, on average 7.8 km; those selling only to a traditional channel are on average closer, namely 4.9 km. However one would expect the opposite, as is found by other studies, for example Reardon et al. (2006). A possible explanation is that farmers that are further from the main road have more access to land.

Farmers in the sample have an average experience of 14 years. The average farm size is 4 hectares of which 3.2 hectares is arable land. Total income earned with farming is R4,250 per month (463 Euro) for farmers selling to a modern market channel and R2,377 per month (259 Euro) for farmers only selling to a traditional market channel. Farmers selling to a modern market channel have a significant higher level of capitalisation; the ownership of a car is 25%, 3.6% own a lorry and 29% of the farmers have their own tractor. For farmers not selling to modern market channel this is respectively 8.2%, 0% and 19%.

Almost all farmers have access to irrigation, 97% of the total sample. However there are differences in the type of irrigation between the two groups, of the farmers selling to modern market channels 43% have their own irrigation system. For farmers selling to a traditional market channel this share is only 27%, the others are dependent on shared irrigation systems.

Another remarkable difference between the two groups is membership of a cooperative. One would expect a higher membership percentage of farmers selling to modern market channels, because of their relatively modern way of producing (compared to farmers selling to traditional channels). However the

membership share of smallholders is much higher for farmers selling to traditional market channels, namely 71% compared to only 25% of the other group. One possibility of this counterintuitive outcome may be that smallholders already supplying to modern market channels do not need the membership of a cooperative, since they have already found market access. It furthermore depends on the type of services provided by the cooperative, but the data in this study cannot answer this question. For membership of a tomato producer organisation it is the other way around, 43% of farmers selling to a modern market channel is a member, compared to 25% of the farmers selling to a traditional channel.

Both groups of farmers receive technical information from an extension worker, 83% of the farmers in the sample are visited by an extension worker, there is almost no difference between both groups.

5.2.3 Tomato production characteristics

Farmers selling tomatoes to a modern market channel have significantly more experience in producing tomatoes, 10 years on average, compared to 6.4 years for the other group. This indicates that selling to a modern market channel requires experience.

The expectation that farmers selling to a modern market channel have a bigger production and earn a higher income is confirmed. Farmers selling to a modern market channel produce 2,834 kilos of tomatoes and earn 6,808 Rand (742 Euro), compared to respectively 2,108 kilos and 2,755 Rand (300 Euro) for the other group.

There is not much difference in the share of grade 1 tomatoes. However one would expect that farmers selling tomatoes to modern market channels have a higher share, since modern market channels usually demand a higher quality product. The share for both groups is around 60%. Nevertheless there is a significant difference in the type of tomato produced. Modern market channels usually demand table tomatoes, instead of jam tomatoes. Table tomatoes are perceived to be a more luxury type of tomatoes, whereas jam tomatoes are the traditional type much used by poor consumers in traditional dishes (NDA, 2007b). Farmers selling to modern market channels have a significantly higher share of table tomatoes, namely 71% of their production consists of table tomatoes. For farmers that are only selling to traditional channel this share is 52%.

5.2.4 Conclusion

When comparing the farmers in the two market channels (modern and traditional), the most important outcomes are: farmers selling to a modern market channel have (1) a bigger size of arable land, (2) a higher capital index

and (3) a higher average income. No significant differences are observed in access to irrigation, percentage of grade 1 tomatoes.

5.3 Determinants of market channel choice

5.3.1 Sample range

The sample range was adjusted by removing the farmers with more than 10 hectares of arable land and an income higher than 10,000 Rand a month. These outliers influenced the output of the analysis.

5.3.2 Analysis 1: Supermarkets

In this section the results of the probit analysis will be discussed, starting with the results of analysis 1: the probit analysis of the determinants of market channel choice, the sample in this analysis will be divided in farmers that supply to supermarkets and farmers that do not supply to supermarkets. In Table 6 the output of the analysis is shown. There is only one variable slightly significant, namely household size (HHSIZE). 95% of output was estimated correctly, but the large standard errors reduce the quality of the prediction.

Table 6: E-views output of analysis 1

Dependent Variable: SELLSUP
Method: ML - Binary Probit
Date: 08/25/07 Time: 16:03
Sample: 1 1 3 5 7 8 11 35 37 41 43 78 80 96 99 102 104 107 109
109 111 112
Included observations: 100
Convergence achieved after 25 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-3.068341	2.765058	-1.109684	0.2671
AGE	-0.023588	0.036931	-0.638697	0.5230
AGRTRAIN	4.683746	3.004671	1.558821	0.1190
ARABLE	0.676525	0.542476	1.247106	0.2124
DIS	0.033436	0.038190	0.875525	0.3813
EDU	0.066691	0.116352	0.573183	0.5665
EXP	-0.040677	0.099348	-0.409438	0.6822
FULLTIME	0.952666	0.995376	0.957092	0.3385
HHSIZE	-0.669054	0.404899	-1.652397	0.0985*
HHTYPEDUM	-0.192886	1.214981	-0.158756	0.8739
LANDREFORM	-7.022111	14227604	-4.94E-07	1.0000
LOCDUMEHL	-11.19902	6439293.	-1.74E-06	1.0000
LOCDUMMOP	3.611969	2.254022	1.602455	0.1091
TOMEXP	-0.180156	0.134382	-1.340628	0.1800
Mean dependent var	0.070000	S.D. dependent var		0.256432
S.E. of regression	0.208180	Akaike info criterion		0.494051
Sum squared resid	3.727143	Schwarz criterion		0.858775
Log likelihood	-10.70256	Hannan-Quinn criter.		0.641661
Restr. log likelihood	-25.36389	Avg. log likelihood		-0.107026
LR statistic (13 df)	29.32268	McFadden R-squared		0.578040
Probability(LR stat)	0.005890			
Obs with Dep=0	93	Total obs		100
Obs with Dep=1	7			

Based on these outputs one can say that the number of smallholder selling to supermarkets is too low to do a relevant probit analysis.

5.3.3 Analysis 2: Supermarkets and agro-processors

In analysis 2 the sample was divided into farmers that supply to supermarkets and/or agro-processors and those that do not. Some variables were excluded from the analysis, because they correlated with the dependent variable, these variables are membership of a tomato producer organisation (MEMTOMPRO), membership of a cooperative (MEMCOOP), the use of hybrid seeds (HYBSEEDDUM), being located in Vhembe (LOCDUMVHE) and being located in Ehlanzeni (LOCDUMEHL). Therefore only the dummy for being located in Mopani (LOCDUMMOP) was included in the model. LANDREFORM has a too big standard error, so this is removed, as are access to a pack house (PACKH) and access to credit (CREDIT).

The output is shown in Table 7. This output table show that the results are still not significant, only household size (HHSIZE) and reception of technical information (TECHINFO) are significant. The group of farmers selling to these channels is still too low.

Table 7: E-views output of analysis 2

Dependent Variable: SELLSP
Method: ML - Binary Probit
Date: 08/25/07 Time: 16:22
Sample: 1 1 3 5 7 8 11 35 37 41 43 78 80 96 99 102 104 107 109
109 111 112
Included observations: 100
Convergence achieved after 8 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.330123	2.520592	-0.924435	0.3553
AGE	0.009352	0.027720	0.337356	0.7358
AGRTRAIN	0.503503	0.862273	0.583925	0.5593
ARABLE	-0.366406	0.258630	-1.416721	0.1566
CAPINDEX	-0.579378	0.603554	-0.959945	0.3371
CHMARK	1.664474	1.193676	1.394411	0.1632
DIS	-0.007035	0.028761	-0.244592	0.8068
EDU	0.134249	0.135683	0.989434	0.3225
EXP	0.038578	0.036124	1.067925	0.2856
FULLTIME	0.857124	0.928978	0.922653	0.3562
GRADETOM	-0.742636	1.526508	-0.486493	0.6266
HHSIZE	-0.372134	0.163677	-2.273594	0.0230**
HHTYPEDUM	2.668276	1.567914	1.701800	0.0888*
INDIRRIDUM	0.517615	0.879212	0.588726	0.5560
LOCDUMMOP	1.103338	0.878710	1.255634	0.2092
TECHINFO	-2.036349	1.218958	-1.670565	0.0948*
TOMEXP	0.018264	0.039038	0.467841	0.6399
Mean dependent var	0.090000	S.D. dependent var		0.287623
S.E. of regression	0.227896	Akaike info criterion		0.615885
Sum squared resid	4.310751	Schwarz criterion		1.058763
Log likelihood	-13.79423	Hannan-Quinn criter.		0.795126
Restr. log likelihood	-30.25378	Avg. log likelihood		-0.137942
LR statistic (16 df)	32.91911	McFadden R-squared		0.544049

Probability(LR stat)	0.007575		
Obs with Dep=0	91	Total obs	100
Obs with Dep=1	9		

5.3.4 Analysis 3: Supermarkets, agro-processors and fresh produce markets.

In analysis 3 the fresh produce market is included in the modern market channel, now the share selling to a modern market channel is increased to 25%, which is a better share for the probit analysis. First it was determined which location dummies could best be included in the model. A combination of the dummy for being located in Mopani (LOCDUMMOP) and the dummy for being located in Ehlanzeni (LOCDUMEHL) give the highest percentage estimated correctly, and are therefore used in the further analysis. Furthermore the variable for the capital intensity (CAPINDEX) is replaced by the variable for ownership of a car (CAR), since this increases the percentage estimated correctly from 92% to 94%. Correlation of these variables give a very good result, with no significant correlation between any variables in the equation.

Table 8: E-views output of analysis 3

Dependent Variable: SELLSPF
Method: ML - Binary Probit
Date: 08/25/07 Time: 14:09
Sample: 1 1 3 5 7 8 11 35 37 41 43 78 80 96 99 102 104 107 109
109 111 112
Included observations: 100
Convergence achieved after 8 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-5.448778	2.908991	-1.873082	0.0611*
AGE	0.095908	0.040797	2.350881	0.0187**
AGRTRAIN	-0.915308	0.749713	-1.220878	0.2221
ARABLE	-0.045252	0.213992	-0.211465	0.8325
CAR	1.887880	1.338025	1.410945	0.1583
CHMARK	2.967471	1.151775	2.576432	0.0100**
CRED	0.484206	1.795776	0.269636	0.7874
DIS	0.006132	0.020576	0.298031	0.7657
EDU	0.083507	0.080117	1.042320	0.2973
EXP	-0.044538	0.031674	-1.406119	0.1597
FULLTIME	1.134058	1.429785	0.793167	0.4277
GRADETOM	0.941093	1.163489	0.808854	0.4186
HHSIZE	-0.278501	0.143844	-1.936136	0.0529*
HHTYPEDUM	-1.189918	0.918608	-1.295349	0.1952
HYBSEEDDUM	-2.089867	1.141172	-1.831333	0.0671*
INDIRRIDUM	-1.196992	1.199259	-0.998110	0.3182
LANDREFORM	-0.171807	1.444259	-0.118958	0.9053
LOCDUMMOP	2.525541	1.115558	2.263926	0.0236**
LOCDUMEHL	-2.288779	0.836515	-2.736088	0.0062***
MEMCOOP	-2.080415	0.886902	-2.345709	0.0190**
MEMTOMPRO	0.303689	0.720869	0.421282	0.6735
PACKH	0.815860	1.327373	0.614642	0.5388
TECHINFO	2.068673	0.961736	2.150977	0.0315**
TOMEXP	0.020678	0.051790	0.399263	0.6897
Mean dependent var	0.220000	S.D. dependent var		0.416333
S.E. of regression	0.260322	Akaike info criterion		0.875522
Sum squared resid	5.150342	Schwarz criterion		1.500763

Log likelihood	-19.77610	Hannan-Quinn criter.	1.128568
Restr. log likelihood	-52.69080	Avg. log likelihood	-0.197761
LR statistic (23 df)	65.82939	McFadden R-squared	0.624676
Probability(LR stat)	5.26E-06		
Obs with Dep=0	78	Total obs	100
Obs with Dep=1	22		

In this analysis there are many significant variables. First of all the location dummies are highly significant; being located in Mopani (LOCDUMMOP) has a positive effect on selling to supermarkets and being located in Ehlanzeni (LOCDUMEHL) has a negative effect. From the comparison over district it was already expected that location might have a significant effect, because of the large differences between the districts. Furthermore membership of a cooperation (MEMCOOP) has a significant negative effect on the dependent variable. Age has a positive effect, so older farmers are more likely to sell to supermarkets. Other significant variables are whether the producer has changed market channel in the past(CHMARK), which gives a positive sign; reception of technical information (TECHINFO), which gives a negative sign; the number of people in the household (HHSIZE), which gives negative sign and the use of hybrid seeds (HYBSEEDDUM), which has a negative impact.

A positive outcome for smallholders is the non-significant outcome of the size of arable land (ARABLE), so size of arable land is not correlated with sales to modern market channels. Consequently the smaller farmers in this sample are not disadvantaged over bigger farmers. Furthermore farmers do not need more experience to sell to modern market channels, since there is no relation between the variables for experience (EXP) and the experience in producing tomatoes (TOMEXP) and the dependent variable. Therefore the experience in farming and experience in producing tomatoes are not determining market channel choice. Access to credit (CRED) is another non-significant variable; it has no significant effect on sales to a modern market channel.

5.4 Conclusion

In this research it was not possible to determine which household characteristics are significant in selling to supermarkets, for the share farmers selling to this channel in the total sample is too low. Adding farmers that sell to agro-processors still didn't increase this share to a level that is significant. Hence fresh produce markets were added to the modern market channel. Only analysis 3 had a significant share of farmers selling to modern market channels.

There were many significant variables; location, age and whether the farmer has changed market channel have a positive effect on supplying to a modern market channel. Size of the household, membership of a cooperative, whether the farmers received technical information and the use of hybrid seeds

have a negative effect on sales to a modern market channel. A positive outcome for small farmers in this research is the fact that size of arable land and experience in farming and producing tomatoes are not related, therefore small farmers are not disadvantaged over bigger farmers.

6. Conclusions

6.1 General

Supermarkets are becoming more important in developing countries. The rise of supermarkets in Africa came after Latin America and East and Southeast Asia and is comparable to the rise of supermarkets in developed countries decades ago. The last decade, supermarkets have moved from a place where only rich people shop, to a format that is also available for middle class and poor consumers. Supermarkets were able to offer products for lower prices, because of a rising efficiency in supply chains. Therefore supermarkets became available for a growing segment of the population.

Three forces are important for driving the rise of supermarkets in developing countries; the first force is a change in consumer demand, second is FDI and third is the availability of modern procurement system technology.

The first force, consumer demand, is changing because of rising incomes, urbanisation, female employment and a rise of a middle class. This leads to a different lifestyle, including profound diet changes; consumers are increasingly demanding products that have a higher quality and food safety level. The changing consumer demand therefore caused a need to change the retail sector in developing countries.

The second force, FDI, is another important driver that changed the retail sector and caused a rise of supermarkets. FDI provided the capital that was needed to change the retail sector. FDI is made possible because of the liberalisation of developing country markets and has also spurred the rise of supermarkets in other developing countries.

The availability of modern procurement system technology is the third force that drove the rise of supermarkets. Tools became available that were needed for the changing the retail sector. As supermarkets are developing their supply chains, the following features are important: (1) use of grades and standards; (2) improvement of logistics in order to make supply chains more efficient; (3) centralisation of procurement; (4) use of contracts and (5) preferred suppliers.

Changing consumer demand, FDI and the availability of modern procurement system technology had a profound impact on the retail sector. Supermarket supply chains became more efficient and streamlined, which significantly changed quality and safety levels of food.

Consequently the suppliers involved in these restructuring market channels are affected by these changes. They need to modernise their

production and transport system in order to meet the requirements of supermarkets.

However not all farmers changed their traditional ways of farming. Especially smallholders are rapidly excluded from modern market channels. For those smallholders that want to supply to supermarkets, there are many obstacles, (1) markets are mature, so it is difficult to get in, (2) Supermarkets prefer big suppliers and (3) the requirements of supermarkets demand a capital intensive way of producing, which smallholders usually do not have.

6.2 Findings in survey

This study analyses the inclusion of smallholders in supermarket supply chains in South Africa and it is based on a survey carried out in three districts in two provinces. The districts Vhembe and Mopani are in Limpopo and the district Ehlanzeni is in Mpumalanga.

The survey was designed to answer the following research questions:

1. What differences can be found between farmers that supply to modern market channels and those that only supply to traditional channels?
2. Which of those factors are significant in determining market channel choice of smallholder tomato farmers in Limpopo and Mpumalanga?

Since Limpopo is a much poorer province, one would expect farming in this province to be less profitable than farming in Mpumalanga. However the opposite is true; farmers in the districts Vhembe and Mopani earn more than the farmers in Ehlanzeni, though average income is the highest in Vhembe.

In Mopani farming methods are most modern, with a higher capital index and a higher share of the use of hybrid seeds and table tomatoes. In Mopani the share of farmers that sell to a modern market channel is the highest, which confirms a relation between sales to a supermarket and modern production methods.

Still this doesn't explain the high income levels in Vhembe. The share of farmers selling to a modern market channel is 25% in this district, so much lower, but income levels are much higher. Nevertheless the data available cannot explain this outcome.

Yet these comparisons over district do not show whether there are significant differences between the farmers in modern and traditional market channels in the whole sample. Therefore the sample is divided into a group of farmers that sell to a traditional channel and a group of farmers that sell to a modern market channel (either supermarkets, processors or fresh produce markets). It was hypothesised (in hypothesis 1) that farmers selling to a modern market channel have a bigger plot size, and practise a modern way of producing (higher capital index, use of hybrid seeds and producing table tomatoes). This

hypothesis is confirmed by the data analysis; (1) farmers selling to a modern market channel grow tomatoes on larger plots, (2) the share of farmers that own car and lorry is higher and (3) the share of farmers that produce table tomatoes is higher. However there is no significant difference in the use of hybrid seeds.

Furthermore it was hypothesised (in hypothesis 2) that farmers selling to a modern market channel have a higher income; because modern market channels are more profitable. This hypothesis is confirmed by the results of the analysis, total income from tomato production is much higher for the farmers that are selling tomatoes to a modern market channel.

Farmers producing tomatoes have different market channels available, traditional market channels (hawkers and open markets) and modern market channels (supermarkets, processors and fresh produce markets). It was hypothesised (in hypothesis 3) that farm households characteristics such as farm size, experience and education determine the choice of market channel.

A probit analysis was carried out to measure the significance and effect of these characteristics on market channel choice. The analysis has a satisfying outcome, because 94% is estimated correctly. Many variables are significant. Location is very important in determining market channel choice, furthermore age and household size are important, with the expected signs. The outcome for the use of hybrid seeds is counterintuitive, since it has a negative effect on market channel choice and it was expected that the relationship would be positive. Perhaps farmers selling to a modern market channel do their own seed selection and therefore use recycled seeds. Other factors that are significant are membership of a cooperative (negative impact), receiving technical information (negative impact) and whether farmers have changed market channel in the past (positive impact). The non-significance of the variables for arable land is a positive outcome for smallholders; size is not important in determining market channel choice. Two other non-significant variables are experience in farming and producing tomatoes.

Still it is important to keep in mind that the division between traditional and modern market channel in this research is distorted, because fresh produce markets are added to the modern market channels. Therefore the outcome is not specifically directed at supermarkets.

6.3 Future of tomato farming for smallholders

The outcome of this analysis describes data about one production season only. Consequently it is difficult to make predictions about the future of (tomato)farming for smallholders. Their possibilities for the future depend on the expansion of supermarkets. Currently markets are mature and supermarkets

have their fixed base of suppliers, therefore many smallholders are not needed for the supply of products. Most growth of supermarkets is expected in townships and rural areas that still have less supermarkets. If more supermarkets are established in these areas, the demand for products will rise. If the base of suppliers of supermarkets is no longer sufficient for the supply of products, supermarkets may attempt to include smallholders into their supply chains.

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Epilogue

During this research, some things did not go as I expected, especially concerning the database. Of course working on a database you did not create yourself gives rises to some problems, but in this research there were more problems. I was promised to receive the database in April, but at the end of June I still hadn't received anything. I did get a version of the database somewhere in June, but two weeks later a received a message that the database I had received was the wrong version. This was accompanied by the note that I would receive the right version in a few days. After waiting for several weeks, feeling time pressure rising, I decided to ask for the current version of the database. I was now getting desperate to finish my thesis in August. Fortunately that version was send to me very soon. When I started exploring the data, it turned out that this version was nowhere near the final stage. I had to exclude 70% of all the farmers in the sample, because there was either data missing or there were many obvious mistakes.

Another problem of the database was the small percentage of farmers in the sample that supplied products to supermarkets, only 3% of the original sample. In the final sample the percentage selling to supermarkets is still too low, namely 6%. Therefore the group selling to modern market channels was extended to supermarkets, processors and fresh products markets. The downside of this measure is that the requirements of fresh produce markets are much lower than the requirements of supermarkets and processors. Hence the group might have lost the distinctive characteristics that modern market channels require. Hopefully the fact that the fresh produce markets are at a large distance from most farmers, increases the exclusiveness of this channel.

The analysis is limited to determinants of market channel choice only, since it was not possible to do the analysis of the effects on income. This is mainly caused by a wrong choice of methods; the method used was not applicable to the circumstances. In a country where most farmers do not keep records, it is difficult to gather data about spending on different items. In the questionnaire farmers were asked for their yearly expenditure on various business related items, a year in this context is too long to give a correct estimate, expenditure per month would have been better. I have done some explorative analysis with this data, but the outcomes were nowhere near significant, and therefore I decided not to use it.

The data is provided by the University of Pretoria and the data entering is done by the Regoverning Markets team. Working on a dataset made by someone else sets rise to a range of problems; mistakes cannot be checked,

interpretation can be different. And since communication with the team was difficult, no feed-back was given on the data.

I hope that the data-analysis as such will be of some support to others working on the same topic, since it is a very interesting and actual topic. However I would advice not to use any outcomes from this study, since the data was of dubious quality.

Annex:

Questionnaire No.....

REGOVERNING MARKETS PROJECT SOUTH AFRICA

COMPONENT 1

QUESTIONNAIRE FOR TOMATO PRODUCERS

Project Description

We are researchers⁴ working for the Department of Agricultural Economics, University of Pretoria in Collaboration with the Departments of Agriculture in Limpopo and Mpumalanga. We are working on a project, which seeks to evaluate smallholder farmers' access to Agricultural Markets. We would want to collect information relating to farmers' agricultural marketing strategies with focus on tomatoes. We therefore request your time to discuss several issues regarding the above topic. We estimate that this discussion will take one hour. Your participation is voluntary.

HOUSEHOLD IDENTIFICATION

Household name		District	
Respondents Name		Province	
Phone number		Enumerator name	
Village Name		Checked by	
Municipality			

SECTION A: HOUSEHOLD DEMOGRAPHY & ECONOMY

1. What is the type of your household?

1. Male headed. 2. Female-headed (de facto) 3. Female headed (dejure) 4. Child headed (youth) 5. Other (specify)

2. What is the age of the household head?

3. How many years of formal education does the household head have?

⁴ Must only interview the head of the household, alternatively the wife if the husband is not present

4. Does the household head hold any Agricultural training? 1. Yes 2.No
5. If yes which type of agricultural training does the household head have?
1. Crop husbandry 2. Animal husbandry 3 Irrigation 4 Management 6 Other (specify)
6. Which level of agricultural training qualification does the household head hold?.
Certificate 2. Diploma 3. Degree 4.other (specify)
7. Is the household head a full time farmer? 1. Yes 2.No
8. If not what else does he/she do outside farming?
9. How many years have you been involved in farming?
10. What is the size of your household (permanent residents only)?
2006/7 2001/2.....

11. What is the composition of your family (fill in below)?

Age	65+	40-64	21-40	10-20	0-9
2006/7					
2001/2					

12. What is the main source of your household income?
1. Agriculture 2. Salary 3. Remittance 5. Business 6. Govt grant 7. Other (specify)

13. What is the total income that your household receive?

Age	2006/7	2001/2
a. Farm income per month/per year?		
b. Non-farm income per month/per year?		

SECTION B: RESOURCE ENDOWMENTS AND INFRASTRUCTURE

Land ownership

Questions	
1.What type of land ownership do you hold for your farm*	
2. What is the size of your farm?	
3. What is the size of the arable land	
4. Do you rent in/out land for farming? 1. Yes 2.No	
5. what is the cost of renting one hectare per season	

*Codes 1) Lease 2) PTO 3) private titles 4) inherited 5) other (specify)

6. Are you a beneficiary of the land reform program which is being implemented by the government ? 1. Yes 2. No

7. If yes, under which program were allocated land?

1. Restitution program 2. Resettlement program

8. How much land were you allocated?.....

Agricultural Equipment

9. Which agricultural equipments do you own/hire, how many do you have and what is the cost of buying/renting each?

Equipment	Ownership 1.Own 2.hire		Number owned		Cost of buying/renting	
	2006/7	2001/2	2006/7	2001/2	2006/7	2001/2
Car(sedan/bakkie)						
Lorry						
Tractor						
Plough						
Ridger						
Harrow						
Cart						
Wheelbarrow						
Knapsacks						
Other (specify)						

10. List the most important agricultural equipments which one needs for tomato production tomato production, what is the cost of each?

Equipment	Do you own 1.Yes 2,No	Cost

11. Which transportation systems do you use for moving your agricultural produce?

1) Own transport 2) public transport 3) cooperative transport 4) hiring 5) others (specify)

12. If you hire transport when do you hire?

1) Buying inputs 2. Marketing 3 Other (Specify)

13. How many times do you hire a week/month/year?

14. How much were you charged per trip (to/from) (R).....

15. Which livestock type do you own, how many of each live stock type, what were and what are the cost of selling each?

Livestock Type	Numbers owned		Cost of selling	
	2006/7	2001/2	2006/7	2001/2
Cattle				
Sheep				
Goats				
Chickens				
Other (specify)				

Infrastructure Greenhouse/tunnels

Question	Greenhouse/tunnels	Pack-house
16. Do you have access to a green house*/pack house 1. Own 2 rent 3. Other (specify)		
17.If you own greenhouse/pack house how much did it cost to construct		
18.If You rent greenhouse/pack house how much rent do you pay		
19 How many other people do you share with? Greenhouse/pack house		
20. Which other crops are grown in this greenhouse/pack house?		
21.What is the size of the green house//pack house		

*Assume Greenhouse=plastic tunnels

SECTION C: ACCESS TO WATER AND CROP PRODUCTION

1. Which agricultural crops (grain and cash) do you grow on your farm, state the plot size for each crop and the total production for each.

Crops	Plot size		Total Production	
	2006/7	2001/2	2006/7	2001/2
Crop 1				
Crop 2				
Crop 3				
Crop 4				
Crop 5				

IRRIGATION

Question	RESPONSE
2. Do you have irrigation for agriculture production? 1. Yes 2.No	
3. Which year did you establish irrigation system on your farm?	
4.What are your main sources of water for irrigation activities? 1) Own borehole 2) own dam 3) Community dam 4) river	
5. Which type of irrigation systems do you use for growing your tomatoes? 1) Drip irrigation 2) hydroponics 3) flood irrigation 4) Sprinkler 5. Other (specify)	
6.Have you ever experienced problems of water shortage? 1.Yes 2..No,	
7. If yes which years?	
8. Is the irrigation facility private or shared? 1. Individual 2 Shared 3.Other (specify)	
9. If you share how many people do you share with?	
10.. If you share do you have a water management committee? 1.Yes 2.No	
11. How much do you pay as fees or rents for irrigation R	

12. Which crops do you irrigate and what are the plot sizes?

	Crop	Plot size
Crop 1		
Crop 2		
Crop 3		
Crop 4		

13. What is/was the total cost of irrigating your plots per month/year?
2006/7.....2001/2.....

SECTION D SOCIAL CAPITAL AND COMMUNITY PARTICIPATION

COOPERATIVES

1. Are you a member of a local cooperative organisation? 1. Yes 2.No
2. What is the name of the organisation?.....
3. When did you join the organisation?
4. Which post do you hold in the cooperative? .
5. What is the joining/membership fee?.....
6. Which agricultural activities are your cooperative involve in?
1. Production 2. Output Marketing 3. Inputs supply 4. Other (specify)
8. What agricultural services do you receive from the cooperative?
1. Extension 2. Input marketing 3, output marketing 4 other (specify)

PRODUCER ORGANISATION

9. Do you belong to any tomato producer organisation? 1. Yes 2.No

10. What services does the producer organisation provide you with?

1) Input credit 2) training 3) market information 4) transport 5) extension 6) other

EXTENSION

11. Do receive technical information from your local extension workers? 1. Yes 2.No

12. What is the frequency of visits to your farm by your local extension worker?

1) Times per week...2) Times per month.... 3) Times per year.....

13. Are you satisfied by extension service, which you get? 1. Yes 2.No

14. Where else do you get agricultural information from?

1.Companies 2. Neighbouring farmer 3. Other (specify)

CREDIT

15. Have you ever-accessed credit to finance your agricultural production activities? 1. Yes 2.No

16. Access to credit questions

Question	Responses(fill)
16a. Where did you get the credit from	
16b .What did you use the credit for	
16c .How much interest did you pay	
16d .How much was your credit	
16f .How much credit do want next farming season	

17. Are you a beneficiary of the credit programs (CASP or MAFISA)?

1. Yes 2. No

18. If yes, in which way did you benefit?

ACCESS TO MARKETS AND MARKET INFRASTRUCTURE

19. What is the distance from your farm to the following place (in kilometres) what is the cost of public transport to these places (to/from)?

Crops		
	KM	Cost
Main road		
Nearest City		
Fresh Produce Market		
Municipal Market		
Tiger Foods		
Giants		
SPAR		
Shoprite		
Fruit and Veg City		

Proximity and presence of fresh produce market channels

Question	2006/7	2001/2
20. How many Supermarkets are in your area (<50km radius)?		
21. How many Tomato Processors do you have in your area (<50km radius)?		
22. How many Fresh Produce Market do you have in your area (<50km radius)?		

23. Where do you get marketing information for fresh produce products?

1. Local extension worker 2. Media 3. Producer Organisation 4. Other (specify)

Input Markets

24. Where do you buy your agricultural inputs, what is the distance and the transport cost incurred in buying inputs?

	KM		Cost	
	2006/7	2001/2	2006/7	2001/2
Seed				
Fertilizer				
Chemicals				
Equipments				

SECTION E: TOMATO PRODUCTION

1. When did you start producing tomatoes?

Question	2006/7 season	2001/2002 season
.2 How much of your arable land is under tomato total production?		
3. How much tomato production land do you put under irrigation		
4. Which type of tomatoes do you produce? 1. <i>Fruit tomatoes</i> 2. <i>Table tomatoes</i>		
5. Which type of tomato seeds do you use? 1 Hybrid 2. Recycled 3 other (specify)		

6. Which varieties do you grow; on what plot size and what was the total production in the past seasons?

	Variety	Area	Total harvest (boxes/crates/tonnes)
2006/7 season			
2001/2 season			

7. Which fertiliser/chemical types do you put on your tomatoes, what quantities do you apply and what are the unit costs for these fertilisers and chemicals?

	Fertilizer		Chemicals	
	2006/7	2001/2	2006/7	2001/2
Type				
Quantity applied				
Area applied				
Cost per unit				

Labour use

Question	2006/7	2001/2
8. How much labour do you use for tomato production		
9. How much of your labour is from own family		
10. How much of your labour is hired		

11. How much money do you pay your labour?

Temporary labour

Permanent labour.....

12. How much labour persons do you use for each of the following tomato production activities, how long it takes to complete and what is the total costs for each.

Activity	Number of People		Number of days		Total cost	
	2006/7	2001/2	2006/7	2001/2	2006/7	2001/2
Nursery						
Land preparation						
Planting						
Weeding						
Harvesting						

13. For which activities do you usually hire labour for?

1. Planting, 2. Nursing, 3. Harvesting 4. Packaging) 5 other (specify)

Production Cycles

Question	2006/7	2001/7
14. In which month/s do you plant your tomatoes?		
15. In which month/s do you harvest your tomatoes?		
16. How many tomato harvest cycles do you have per production cycle		

17. Do you grade your tomatoes after harvesting for markets?, 1 Yes 2.No

18. Who does the grading? 1. Self 2. Buyers' 3.Others (specify)

19. How many grades do you sort your tomatoes into?

20. Normally what is the percentage of grade 1 tomatoes out of your total tomato production per season?

21. What is the total income per season, which you get from tomato production?

2006/7..... 2001/2.....

SECTION F: TOMATO MARKETING

Market Choices (use the codes below)

Question	
1. Which market channels do farmers use in your area for selling their tomatoes?	
2.. Which market channels do you use to sell your tomatoes to	
3.Which ones are the most common,/popular with smallholder/emerging farmers,	

Codes 1.Supermarkets 2.Agro processors 3. Fresh produce markets 4.Hawkers on foot
5.Hawkers with bakkie/truck 6. Local market

- 4a. Have you changed tomato-marketing channels over the past five years 1.Yes 2.No
4b. If you have changed marketing channel choice can you please explain how you changed?

Tick the appropriate box as responded above

Questions	Supermarkets (Specify)	Agro processors (specify)	Fresh produce Market (Specify)	Hawkers on foot (Specify)	Hawkers with bakkie/truck (Specify)	Local market
5a. Why do you sell to?						
5b. Why are you not selling to? Currently						
5c. Do you sell as individual/group? Currently						
5d. Which time of the year do you sell to						
5e. Do you have a contract?						
5f. What type of contract? 1. verbal 2 written						
5h. How long is the contract						

5. Quantity supplied and Prices

Question	1. Supermarkets (specify)		2. Agro processors (specify)		3. Fresh produce markets (specify)		4. Hawkiers on foot (specify)		5. Hawkiers with bakkie/truck (specify)		Local Market (specify)	
	2006/7	2001/2	2006/7	2001/2	2006/7	2001/2	2006/7	2001/2	2006/7	2001/2	2006/7	2001/2
6a. What is the total transport cost												
6b. What is the quantity which you supplied last season												
6c. What is the quantity which you supply (per year/week/year												
6g. What is price in season												
6h. What is price off season												

6j.How is price determined												
6k.When are prices determined?												

7. Quality and grades (ask for all the Chains)

Question	1.Supermarkets (Specify)	2.Agro processors (Specify)	3. Fresh produce markets (specify)	4.Hawkers on foot (Specify)	5.Hawkers with bakkie/truck (specify)	Local Market (specify)
7a.What are their quality standards requirements						
7b.What are their packaging and labelling requirements						
7c.Which grades do they buy						
7d.Do they pay extra premium for quality 1.Yes 2.No						

8. Hypothetical question

If you have one crate of tomatoes, where would you sell under the following circumstances?

Question	Response
8a.If you want fast cash?	
9b.if you want the highest price?	
8c.if you want to create a long term supply relationship?	
8d. if you want to sell your best tomatoes grade 1 quality?	
8e.If you want to sell un-graded tomatoes?	

9. Have you ever noticed change over the past five years with regard to marketing of tomatoes for the following market outlets?

	Number 1.yes 2.No	Quantity Requirements (explain)	Packaging & labelling requirements (explain)
9a.Traditional open markets			
9b.Supermarkets			
9c.Wholesalers / fresh produce markets			
9d.Hawkers			
9e.Tomato Processors			

10. What does it takes for smallholder farmers to supply

Supermarkets?

SPAR.....

Pick n Pay

Shoprite/Checkers.....

Processors

a. Tiger brands.....

b. Giants.....

Fresh produce Markets

a. Kosiyami(Polokwane).....

b. Johannesburg Fresh Produce.....

c. Tshwane Fresh Produce

11. What are the major limiting factors which restricts tomatoes farmers from selling your fresh produce commodities to

Supermarkets?

SPAR.....

Pick n Pay

Shoprite/Checkers.....

Processors

a. Tiger brands.....

b. Giants.....

Fresh produce Markets

- a. Kosiyaami(Polokwane).....
- b. Johannesburg Fresh Produce.....
- c. Tshwane Fresh Produce

Thank you!