# A COOPERATIVE MODEL FOR ENHANCING MARKET PARTICIPATION BY SMALL HOLDER MANGO FARMERS IN [illegible]BE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA


By

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A thesis for Doctor of Philosophy in Rural Development (PhDRDV) Degree


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SOUTH AFRRICA


September 2014

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## DECLARATION

I, Thakhani Kennedy Takalani, hereby declare that this thesis for Doctor of Philosophy Degree in Rural Development (PhDRDV) submitted to the Institute for Rural Development at the University of Venda has not been submitted previously for any degree at this or another university. It is original in design and in execution, and all reference material contained herein has been duly acknowledged.

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## ABSTRACT

Intervention approaches for strengthening smallholder mango farming in South Africa and beyond suffer from affected stakeholder deficit. Consequently, there is little or no market participation by this sector. This is taking place at a time when research institutions are increasingly being compelled to find sustainable solutions to such challenges. Clearly, there is urgent need for formulating intervention frameworks and models that are stakeholder-driven.

In Vhembe District Municipality the stakeholders encompass Local Economic Development officers in Municipalities, extension officers, mango processors, fresh produce market agents, mango commodity associations and smallholder mango farmers. All these participated in this study. In phase 1 of this study, all of them participated as key informants. Pre-research activities involved creating awareness of the planned work and instilling a sense of ownership among the stakeholders. They were also requested to commit to play active roles throughout the study. Simple Random sampling procedures were used to select respondents. All the stakeholder groups were invited to participate in focus group discussions in phase 2. The results of the first and second phases of the study were used to develop a questionnaire which was then administered to 152 smallholder mango farmers.

The questionnaire required responses on a modified Likert-type scale ranging from 1 (strongly disagree) to 10 (strongly agree). Furthermore, qualitative data on mango consumer demands were collected during a survey that was based on administering a questionnaire to 261 mango consumers in the entire Vhembe District. Furthermore, analysis of physico-chemical attributes of mangoes were conducted in the laboratories with the aim of comparing the quality of the fruit from smallholder and large-scale commercial farming sectors. The data were analysed using the Statistical Package for Social Sciences (SPSS) version 22.0. Mean scores and standard deviations for each perception were computed and used for ranking. Frequencies of the same perceptions were also calculated. The Tukey range test was carried out to determine if there were differences between means.

The study confirmed that despite the considerable contribution of smallholder mango farming sector to rural development, the farmers still face multiple challenges in production, processing and marketing. Among others, smallholder mango farmers lack on-farm infrastructure, technical skills and financial support. There were considerable post-harvest losses due to rotting. The major processing-based challenges included lack of facilities, and



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inadequate technical knowledge and skills. With respect to marketing, long distances between farms and markets, poor road infrastructure linking farms and markets, poor quality of products compared to those of competitors, and lack of control or voice in lucrative markets were key problems they faced. These challenges were the main constraints, which made it difficult for smallholder mango farmers to actively participate in commercial markets.

No significant differences ($P < 0.05$) were observed in all the parameters of quality of mangoes from smallholder and large-scale commercial farming sectors. Mango cultivars from smallholder mango farming systems in Vhembe District were found to fulfil the standard parameters considered when determining marketable quality. The study also confirmed that in Vhembe District, fresh mango and its products are popular among both youth and adult consumers. This implied that a ready market for mangoes from the smallholder farming sector existed. The results of this study were used to suggest an intervention framework anchored on stakeholder participation to resolve the challenges inherent in production, processing and marketing. Furthermore a cooperative model was developed to assist farmers to implement the intervention framework.

This may enable the smallholder mango farmers to improve and participate in all the levels of the commodity supply chain. Although the framework and model were developed for the Vhembe District, they have the potential to reshape smallholder mango farming development/improvement planning in South Africa and beyond. This study has provided pointers on how to fully involve affected stakeholders in decision making and taking action in their own development for achieving sustainable smallholder mango farming and rural development.

**Key words:** Smallholder mango farmer, market constraints, stakeholder-driven, intervention framework, cooperative model.



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## ACKNOWLEDGEMENTS

The only viable way of completing a project of any significant magnitude is to partly relinquish control to others. My thesis was not an exception to this rule. I, therefore, share the ownership of this work with several others and wish to acknowledge their contributions.

I, especially wish to express my appreciation and gratitude to Professors Joseph Francis, G.R.A. Mchau and Dr. Jethro Zuwarimwe for their competent supervision. Besides critically reviewing successive drafts of the thesis, they offered constructive criticism and instilled a lot of confidence in me.

Further acknowledgements go to colleagues at the Limpopo Department of Agriculture (Vhembe District Offices) and Mango Commodity Association Executive Committee members for their role in data collection: Ntamiseni Mankhili, Abraham Ngwalungwalu and Moses Makheda, I thank you. I will always miss the full cooperation, hospitality and companionship of the farmers in Vhembe District. They remained interested partners who honestly provided me with numerous ideas and insights into their farming. I also would like to thank the graduate students Thaniki Tshigoda, Anza Negota and Managa, who worked tirelessly to collect data.

Quite a number of colleagues in the School of Agriculture, University of Venda, kept on motivating and encouraging me during this project. Their warm and generous friendship was always a constant source of inspiration, particularly when things did not appear to work according to plan. They were Drs Priscilla Masipa, John Mudau, Professor A.I.O. Jideani and Agnes Mathaulula. I thank them all.

This study could not have been possible without the financial support received from the University of Venda (RPC) and National Research Foundation (NRF) through the Community University Partnership Programme (CUPP).

A special thank you is also due to my family that always offered me warm companionship and always put its trust in my efforts.

Above all, I thank God from the bottom of my heart, for giving me courage to invest time and finances in this study. He made it possible for things to happen.



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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AgriBEE | Agricultural Black Economic Empowerment |
| AgriSA | Agri South Africa |
| BBBEE | Broad Based Black Economic Empowerment |
| CASP | Comprehensive Agricultural Support Programme |
| DBSA | Development Bank of Southern Africa |
| FAOSTAT | Food and Agriculture Organisation of the United Nations Stastistics |
| FDT | Farmer Development Plan |
| FGD | Focus Group Discussions |
| FSP | Farmer Support Program |
| GDP | Gross Domestic Product |
| GNP | Gross National Product |
| IDP | Integrated Development Plan |
| IFPRI | International Food Policy Research Institute |
| KII | Key Informant Interviews |
| LED | Local Economic Development |
| LRAD | Land Redistribution for Agricultural Development |
| MT | Metric Tonnes |
| NAFU | National African Farmers Union |
| NAMC | National Agriculture Marketing Council |
| NFI | Net Farm Income |
| NFP | Net Farm Profit |
| SAMGA | South African Mango Growers Association |
| SASIX | South African Social Investment Exchange |
| SPSS | Statistical Package for Social Scientists |
| StatsSA | Statistics South Africa |
| VDM | Vhembe District Municipality |



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# CHAPTER 1: INTRODUCTION AND BACKGROUND OF THE STUDY

Mangoes together with pineapples, papaya and avocado are the dominant tropical fruit varieties produced worldwide (Adesina and Sheu, 2007). According to Food and Agricultural Organization (FAO, 2004), developing countries account for 98 % of total mango production, while developed countries account for 80 % of world import trade of mango. Throughout the world, mangoes are produced in more than 90 countries, with Asia accounting for approximately 77 %, followed by South America (13 %) and Africa (10 %) (FAO, 2012). Mango production doubled in thirty years and reached approximately 35 metric tonnes (MT) in 2009. India is the largest producer of mangoes accounting for 50 % of total production from all parts of the world. Its crop averaged 17 MT, followed by China (4 MT), Thailand (2.5 MT) and Pakistan (1.7 MT). In South America, Mexico (1.5 MT) and Brazil (1.2 MT) are placed 5$^{th}$ and 7$^{th}$, respectively in the world rankings. The main African mango producing country is Nigeria (0.73 MT), followed by Egypt (0.45 MT).

South Africa is ranked 8$^{th}$ in Africa and produces 52 764 tonnes per year (Department of Agriculture, Forestry and Fisheries, DAFF, 2011). The most common commercial mango varieties in the country are Tommy Atkins, Sensation, Kent, Keit and Heid. Limpopo, one of the nine provinces in the country, contributes about 33 020 tonnes of mangoes, which translates to almost 66 % of total national production. Coming a distant second is Mpumalanga Province which produces 13 021 tonnes (26 %), Kwa-Zulu Natal with 4007 tonnes (6 %), Eastern Cape with 501 tonnes (1 %) and other Provinces with a collective share of 1 %.

In Limpopo Province, Mopani District produces 98 % of the mangoes, with Vhembe District contributing the remaining 2 % (DAFF, 2011). The Vhembe District Municipality (VDM) local economic development (LED) strategy of 2007 and VDM Agricultural Strategy of 2009 reveal that smallholder farmers produce the bulk of the mangoes in the District. This is the case despite the fact that they find it difficult to access lucrative markets. As a result of this problem, considerable amounts of the mangoes are lost every season through rotting.

In theoretical terms, smallholder farmers in South Africa have equal access to the nation's local and export markets just like large-scale commercial producers. However, quality and quantity constraints collectively keep smallholder farmers' participation in these markets below 1 % (KojoAihoon *et al.*, 2009). This evidence highlights the potential benefits that smallholder farmers and in particular those involved in mango production might bring to the



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economy if they are properly developed. The fact that mangoes are currently ranked the third most popular fruit after citrus and bananas (DAFF, 2011) seems to lend weight to this argument. It could be possible that the fruit might become a key driver of people's livelihoods and rural economies. It is argued that positive and strong multiplier effects of investing in agriculture can be realized especially when smallholder farmers gain access and participate in more lucrative markets (LDA Strategic Plan, 2009).

Access to markets is one of the major factors affecting the performance of smallholder farms in developing countries. In general, smallholder farmers' access to markets for agricultural products enhances and helps diversify the livelihoods of lower-income households, in addition to reducing rural poverty (World Bank, 2008). However, inadequate farm-level resources, farm-to-market logistical bottlenecks, and transaction costs in matching and aggregating dispersed supplies to meet buyer and consumer demand typically constrain smallholder farmers' participation in the markets.

In the context of agri-foods value chains, transaction costs are associated with various stages or phases of the trading relationship between actors. According to the World Bank (2012), search and screening costs are incurred to determine potential buyers and suppliers, and to gauge their ability and willingness to transact. This is in contrast to bargain costs, which are incurred in order to determine the terms of trade and the overall relationship. There are also transfer costs, which are normally associated with shifting physical possession and ownership. Lastly, monitoring and enforcement costs are incurred in order to determine whether the agreed upon terms were actually complied with. All these transaction costs can be in various tangible forms, including staff time, travel and communications, licensing, product inspection, audit, system management expenses, insurance premiums, investments in measurement devices, storage, handling and legal matters.

Most studies (e.g. Pingali *et al.* 2005; Abdulai and Birachi, 2008) focusing on the participation of smallholders in markets have tended to focus more on the analysis of transaction costs that producers face, assuming that these determine their involvement in alternative supply chains. For instance, in India most mango farmers operate on a small-scale and yet the country is the world's largest producer of the fruit. Bourquin and Thiagarajan (2007) reveal that higher returns to farmers estimated at 20-30 % were achieved when an improved marketing model was introduced. In the improved model,



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smallholder mango farmers were linked directly with the commercial value chain. The intervention helped reduce transaction costs, increase returns and also enhanced participation in markets. The improved marketing model contrasted the traditional one as the distribution chain was from the farmer, middlemen, commission agent/trader, wholesaler, retailer and finally, to consumer. Thus, the traditional market was associated with high transaction costs and characteristically low returns.

There are various lessons learnt from Asia and other parts of the world, which highlight the need for addressing challenges associated with smallholder mango farming in places such as Vhembe District Municipality. Special focus should be on accelerating smallholder farmer-led agricultural development, establishment of relevant rural infrastructure and providing more effective services to producers. Experiences gained particularly in Asia and East Africa indicate that cooperatives are among the institutional arrangements that can help smallholder farmers to overcome the numerous constraints they are faced with. According to Birthal *et al.* (2005), cooperatives have the potential to improve productivity in the smallholder farming sector as well as enhance market participation by farmers.

This study was designed to generate scientific evidence to inform decisions on improving smallholder mango farming in Vhembe District Municipality. This would provide possible avenues to enhance the contribution of smallholder farming to rural livelihoods and local economic development. In addition, constraints hindering market participation by the smallholder mango farming system were investigated. Appropriate intervention framework and a cooperative model to reduce the constraints were proposed.

### 1.1 Statement of the Research Problem

There is a growing concern that two decades after attainment of democracy, smallholder mango farming sector participation in the lucrative agricultural markets is still unsatisfactory. There is limited empirically generated evidence to use to enhance their participation, although claimed to be < 20 % participation in Vhembe District, mainly attributed to inadequate information on lucrative markets (VDM, 2009). Given the situation, it is not surprising that both the Vhembe District Municipality and Limpopo Province's Agriculture Development Strategies are silent on the constraints to participation of smallholder mango farmers in markets.

Specific constraints that hamper participation of smallholder mango farmers in lucrative markets are not well understood and thus no widely embraced support framework.



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Therefore, this study sought to examine the constraints affecting market participation by smallholder mango farmers and possible interventions that might help address them in Vhembe District Municipality.

### 1.2 Justification of the Study

Smallholder farming is a source of income, employment and food security for many families in South Africa and beyond. In South Africa, Vhembe District is the second highest mango producer after Mopani. Smallholder farmers produce more mangoes than their commercial counterparts. However, more than 60 % of the mangoes produced on smallholder farms are wasted through rotting, mainly due to lack of access to markets (VDM, 2009). Clearly, this situation demands that appropriate solutions be found to address it.

Various studies have been carried out focusing on the marketing of agricultural produce by smallholder farmers. Among the studies have been those focusing on small-scale farmers' access to markets (Makhura and Mokoena, 2004), quantification of the economic divide (Pauw, 2005), facilitating access to input and product markets (Ortmann and King, 2006) and empowering smallholder farmers in markets (KojoAihoon *et al.*, 2009). Moreover, the South African government has developed policies and programmes aiming to promote and support the marketing of smallholder farmers' produce. However, it is still not clear whether these efforts have been effective in achieving their objectives (Senyolo *et al.,* 2009). Therefore, there is a need to conduct a study in order to monitor and evaluate the effectiveness of these interventions.

Understanding the nature and effects of constraints on mango marketing and how they can be alleviated is cardinal to improving marketing channels as well as rural people's livelihoods. In African economies that are only partially commercialized, smallholder farmers might incur higher marketing constraints than large-scale commercial farmers (Makhura, 2001). The lack of scientifically generated information on the constraints hindering smallholder farmers' participation in markets for mangoes justified research on this issue.

### 1.3 Research Objectives

The main objective of this study was to investigate factors inhibiting smallholder mango farming in Vhembe District from participating in commercial markets. This was done in order to develop an intervention framework and model for improving the smallholder mango farming system. The specific objectives of the study were to:



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a) analyse the smallholders' socio-economic characteristics and production systems;

b) assess the quality of mangoes in relation to market preferences;

c) assess consumer demands for fresh and processed mangoes;

d) examine the constraints associated with accessing markets; and

e) Develop appropriate intervention framework and model to reduce the constraints.

### 1.4 Research Hypotheses

In this study, the following hypotheses were tested:

a) The smallholder mango farming systems in Vhembe district are not well known;

b) The quality of mangoes produced on smallholder farms in Vhembe District is not known; and

c) Consumer demands for fresh and processed mangoes in Vhembe District are unknown.

### 1.5 Definition of Key Terms and Concepts

**Market participation**: Holloway and Ehui (2002) define *market participation* as any market-related activity which promotes the sale of produce.

**Smallholder farmer**: According to Hungwe (2006), in Africa, smallholder farmer embraces a wide spectrum of all small-scale indigenous producers. For the purpose of this study, *smallholder farmer* refers to a Black resource-poor mango producer. His or her reason for being involved in mango farming is to produce mainly for home consumption. Family labour and ownership of a small piece of land are other key characteristics of smallholder farmers.

**Mango:** (*Mangifera indica* L.): It is a tropical evergreen tree, which produces ovoid fruits with smooth rind, sweet juicy flesh and a flat one-seeded stone. It is eaten ripe or pickled when green (Evans, 2008).

**Cooperative:** an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise (Singh, 2010).



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**Agricultural cooperative:** a cooperative that produces, processes and markets agricultural products and supplies agricultural inputs and services to its members (Cooperative Act, Act no. 14 of 2005).

## 1.6 Organization of the Thesis

Chapter 1 has presented the background to the study, the statement of the research problem, justification of the study, objectives, research hypotheses, definitions of key terms and concepts. Following this is Chapter 2, which presents a review of literature on smallholder mango production and marketing, transaction costs in mango markets. Special emphasis is placed on the theoretical framework, the forms, sources and effects of transaction costs. Chapter 3 presents a detailed description of the research methodology used in this study.

The descriptive characteristics of the smallholder mango farming systems in Vhembe District are presented in Chapter 4. While chapter 5 presents the production, processing and marketing challenges of the smallholder mango farmers. This is followed by a comparison of the physico-chemical quality parameters of mangoes from commercial and smallholder farmers, which constitute Chapter 6. In Chapter 7, the consumer preferences for fresh and processed mangoes are articulated. Lastly, Chapter 8 presents the summary, intervention framework, cooperative model, conclusions and recommendations. The lists of references and appendices form the last parts of this thesis.



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## 2.1 Introduction

Smallholder farmers are amongst the most disadvantaged and vulnerable groups in the developing world as they are associated with low level of production, limited market participation and high incidents of poverty. Almost half of the world's undernourished people, three quarters of Africa's malnourished children and the majority of people living in absolute poverty are found in smallholder farms (International Food Policy Research Institute, IFPRI, 2005). They usually lack institutional support such as supportive agriculture policies, credit, marketing, farming inputs, research and extension. These limit their productivity and subsequently lowering Net Farm Income (NFI) and eventually affecting Net Farm Profit (NFP) (Netshifhefhe, 2003).

Smallholder farmers in Southern Africa share certain common features which are as follows:

a. There is often inadequate infrastructural development in terms of water supplies.

b. Local leadership and village organizations are not developed or geared to promote agriculture.

c. Organization of agricultural production is based on simple traditional technology.

d. Traditional culture and customs sometimes act as constraints to agricultural production

e. Smallholder farmers collectively have little or no political influence in agricultural production.

f. Smallholder farming is subsistence oriented.

Given the above challenges faced by smallholder farmers this chapter discusses these aspects focusing more on defining a smallholder farm, characteristics of smallholder farming, importance, transaction costs, support frameworks and commercialization among others.



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## 2.2 Global Mango Production

Mango (*Mangifera indica* L.) is one of the most important fruit crops cultivated in the tropical and sub-tropical low lands (Evans, 2008). It is indigenous to India, Bangladesh, Myanmar and Malaysia. In recent years it can be found growing in more than 60 other countries throughout the world.

The tree is a deep-rooted, evergreen plant which can develop into large trees, especially on deep soil. The height and shape varies considerably among seedlings and cultivars. The plant can grow up to 35-40 m tall, with a crown radius of 10 m. The trees are long-lived as some specimen still fruit after 300 years (Sauco, 2004). The leaves are evergreen, alternate, simple, 15-35 cm long and 6-16 cm broad. The flowers are produced in terminal panicles, 10-40 cm long, each flower is small and white, 5-10 mm long, with a mild sweet odour. There are over 400 cultivars of mango, many of which ripen in summer, while some give double crops (Evans, 2008). The fruit take three to six months to ripen and varies in size and colour.

Globally Asia accounts for approximately 77 %, South America 13 % and Africa 10 % FAOSTAT (2012). Mango production grew at an average annual rate of 2.6 % between 1996 and 2005 and the world production was estimated at 28.5 % in 2005. India, China, Thailand, Indonesia, Pakistan, Mexico, Brazil, Bangladesh, Nigeria and Phillipines are the world's top ten mango producing countries, which account for about 85 % of the world's production (FAOSTAT, 2011).

According to Evans (2008), from 2003 to 2005 India was the largest producer of mangoes, accounting for 38 % of world production. During that period, India's mango crop averaged 10.79 million metric tonnes (MT), followed by China and Thailand at 3.61 (12.9 %) million metric tonnes and 1.73 (6.2 %) million metric tonnes respectively. Other leading mango producers during the same period included Mexico (5.5 %), Indonesia (5.3 %), Pakistan (4.5 %), Brazil (4.3 %), the Philippines (3.5 %), Nigeria (2.6 %) and Egypt (1.3 %).

In 2005, world mango exports reached 912,853 metric tonnes, totalling US $543.10 million (FAOSTAT, 2007). India and Mexico dominated the export trade with shares of 22.6 % and 20.3 %, followed by Brazil (13.2 %) and Pakistan (6.9 %) from 2003 to 2005. Between 1996 and 2005 world imports of mango increased from 397.623 MT to 826.584 MT with the United States of America as the main importer by 271.848 MT (FAOSTAT, 2007). The world top ten importing countries are USA, Netherland, UAE, Saudi Arabia, China, Bangladesh,



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UK, Germany, France and Malysia. Kent, Tommy Atkins, Haden and Keitt continue to be the most popular export mango cultivars because they are firmer, less fibrous and more suited for long distance transportation than other cultivars (Sauco, 2004). Other cultivars like Alphonso, Dudhpeda, Kesar, Sindhu, Pairi, Desi, Chaunsa, Langra and Katchamitaare are also gaining popularity in the international market. The last decade showed a decrease of 5 % in prices for most mango varieties due to the increase in availability worldwide: But with proper promotional efforts these prices could increase (Sauco, 2004).

Sauco (2004) indicated that there is evidence that the processed mango products market is expanding. The main processed products include mango juice, pickled mango, mango chutney, mango pulp, mango paste, mango puree, dried mango fruit, mango slices in brine and mango flour. The main exporter of processed mango is India, followed by Pakistan, Brazil and Zimbabwe (Sauco, 2004). While United Arab Emirates, Saudi Arab, Kuwait, United States, United Kingdom and Canada are the major importers.

### 2.3. Defining Smallholder Farmer

The distinctiveness of the agricultural sector in South Africa implies that clarity regarding the definition of smallholder farmer cannot be ignored. The scenario in other countries is that of farm size ranging from subsistence (small) to agribusiness type (large) (Ortmann and King, 2007). South African agriculture consists of two major categories of farmers namely large-scale commercial farmers and small-scale farmers producing at subsistence level and found mainly in the former homelands (Ortmann and King, 2006).

However, despite the clear-cut categories of farmers in South Africa, there is no consensus regarding the definition of a small farm. There is often a negative perception of smallholder farming being associated with black farmers in the former homelands who are non-productive, non-commercial and who lack the ability to be commercial farmers (Department of Agriculture and Land Affairs, 2007).

The commercial viability assessment of smallholder farming is also another area of disagreement when sampling farmers for research and development purposes. For instance, researchers are often confronted with multiple categories such as emerging farmers, subsistence farmers in the homelands, black farmers, previously disadvantaged farmers and farmers on small pieces of land or farmers with a small turnover (Ortmann and King, 2007). The extent to which objective criteria can be developed to distinguish these categories or whether they are interchangeable remains a major challenge for sampling.



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Given this portrait, great care must be taken on choosing the correct group. Considering the above background information, in this study, a working definition of a smallholder farmer refers to a Black resource-poor mango producer, whose scale of operation is inadequate to attract provision of services needed to significantly increase productivity.

### 2.4 Characteristics of Smallholder Farming

According to the Department of Agriculture and Land Affairs (2007), the smallholder farming sector in South Africa is very diverse and difficult to define, but involves mainly black households, producing on relatively small plots of land with limited resources for household consumption or sale. Pauw (2005) argues that smallholder farmers in most parts of the world, especially developing nations, are rational allocators of available resources, but have limited technical and economic opportunities. In addition, Pauw (2005) noted that due to poverty, smallholder farmers often struggle to support themselves with meager income from agricultural activities. Hence, they rely on other sources of income such as non-agricultural labour income and government grants. The Millennium Project Hunger Task Force (2004) asserts that smallholder agriculture is the main source of food for the rural population as well as an income generating occupation because it is the main activity for many rural parts in developing countries. This implies that smallholder agricultural productivity is very crucial in alleviating poverty and hunger. In recognizing this potential role of smallholder farmers, it is necessary to have a deeper insight into their key characteristics especially regarding their technological status, location, production objectives and factor intensity.

#### 2.4.1 Low Level of Production Technology

The smallholder farming sector is characterized by rudimentary production technology (LDA, 2009). Kalibwani (2005) argues that smallholder farmers in Southern Africa mainly use traditional production techniques and productivity levels are often low. Given this condition, a narrow production base often characterize smallholder farming. The rudimentary technology status can be explained by the fact that the sector is also labour intensive with minimal usage of machinery (Cousins, 2005).

#### 2.4.2 Subsistence

Production in smallholder farming is mainly for subsistence purposes and to a lesser extent marketable surplus (LDA, 2009). Cousins (2009) also confirm this characteristic by asserting that output from smallholder farming for some rural households constitutes a greater proportion of their total livelihoods. Given this picture, production in smallholder farming is



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mainly to meet household subsistence/survival needs. In fact, it is because of such low production levels that there are calls by researchers and policy makers alike, for smallholder farmers to produce beyond subsistence in order to meet national food security goals (South African Social Investment Exchange, SASIX, 2007).

### 2.4.3 Location

Smallholder farmers in South Africa are characterized by their unique location. Smallholder farmers who are mainly blacks and located in the former homelands were reportedly dispossessed of their original land during the apartheid era. The apartheid policies such as the Group Areas Act of 1956 resulted in land imbalances as land allocation was done along racial lines (Obi, 2006). An imbalance in land distribution was especially noted when the white minority were allocated 87 % of Agricultural land whereas the black majority (more than 70 % of the total population) subsisted on the remaining 13 % of the land. In such circumstances, land scarcity is high especially when the population density for black settlement areas was ten times that of whites under the apartheid era . The living conditions are further worsened by the fact that most of the homelands communities are located in areas which are marginally productive and prone to environmental deterioration (Department of Agriculture and Land Affairs, 2007).

### 2.4.4 Factor Intensity

The smallholder agriculture in South Africa is characterized by intensive use of labour which is mainly derived from family members (Dorward, 2006). In this case there is limited usage of external inputs such as machinery and fertilizers (Cousins, 2005). Intensive use of labour in smallholder farming is in some cases a form of self exploitation arising from the fact that the majority are poor, hence, cannot afford external farm inputs. Unlike in larger commercial farms, costs of external labour are too high for smallholder farmers in general; hence they have to do with family labour (Dorward *et al.* 2005).

## 2.5 Importance of Smallholder Agriculture

The significance of smallholder agriculture sector is recognized in the light of its contribution to the welfare of smallholder farmers through poverty alleviation, food security, employment among other related factors at local, regional or international level.



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### 2.5.1 Poverty Alleviation

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

### 2.5.2 Employment Creation

The smallholder farming sector has been recognized as an important sector in employment creation in South Africa. Machethe (2004) argues that smallholder agriculture cannot be treated as just another small adjusting sector of a market economy because it is important to employment, human welfare and political stability in Sub-Saharan Africa.

Nationally, the smallholder farming sector provides employment to at least one million households (Department of Agriculture and Land Affairs, 2007). At provincial level, in Limpopo province for instance, smallholder agriculture has been noted to be contributing 25 % of the jobs for the economically active population (LDA, 2009). This implies that where there is active participation in agriculture, there is more gainful employment. In contrast, very little employment is created when agriculture constitutes a smaller proportion to peoples' livelihoods.

## 2.6 Constraints to Smallholder Agriculture

There are several constraints to the smallholder agricultural sector in South Africa. Due to historical imbalances, South African smallholder farmers are mainly constrained by technical, institutional and market factors such as shortage of farm equipment, inappropriate



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transportation infrastructure and high transaction costs among others (Ortmann and King, 2006).

### 2.6.1 Technical Constraints

Technical constraints to smallholder agriculture are numerous and include the following: absence of equipment to relieve labour shortages, inadequate supply of complementary inputs (such as seeds, chemicals and water), insufficient human capital and inappropriate transportation infrastructure among others (Ortmann and King, 2006). Smallholder farmers are also challenged by inability to effectively control pests and diseases. Technologies for disease control and cure for most developing nations are already known but the problem is delivery.

### 2.6.2 Market Access Constraints

Using concepts developed by the New Institutional Economics, especially Economics of Rural Organization, Lapar *et al.* (2006), define the following constraints that smallholder farmers are facing in accessing agricultural markets: barriers to entry, high transaction costs, high risk, asymmetry of information, low bargaining power, and lack of human and social capital.

#### 2.6.2.1 Barriers to entry

Barriers to entry on a market result primarily from the specificity of the assets needed to produce or sell products, which are either physical means of production, post-harvest equipment, processing facilities, specific knowledge or know-how (Bienabe *et al.* 2004). Other barriers result from the legal framework and institutional environment; coming from licensing and norms as well as standard compliance requirements (Bienabe *et al.* 2004).

#### 2.6.2.2 Risks

Since smallholder farmers have low resource endowment, they tend to be highly vulnerable to production risks due to natural conditions and climatic shocks; and marketing risks due to price fluctuation, transaction risks, etc (Bienabe *et al.* 2004).

#### 2.6.2.3 Transaction costs

Smallholder farmers are facing transaction costs such as market research costs, screening costs, bargaining costs, transfer costs, monitoring cost, enforcement cost, which tend to be higher for farmers living in areas with low population density or remote areas with poor



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infrastructures of communication and transportation (Lapar *et al.* 2006). The transaction costs also tend to be higher for small farmers since their market surpluses are small.

#### 2.6.2.4 Asymmetry of information on markets

Smallholder farmers have little information about the market demand, which is costly to obtain. They may get information through contacts with other actors in the commodity chain but accuracy of this information is not certified since those actors might have "opportunistic behavior" (Bienabe *et al.*, 2004).

The farmers lack information about prices of products at the local level, and at final consumer's level, quality requirements, places and best periods for selling their products, potential buyers; production in other areas; their rights and legislative framework (Bienabe *et al.* 2004). This matter of facts reduces their ability to trade their products efficiently and get full benefit from the marketable part of their production.

#### 2.6.2.5 Lack of bargaining power and asymmetry of negotiation

Bargaining power refers to the relative capacity of different actors to obtain favourable terms from the transaction. It is strongly related to access to information, to producer distance as well as to the perishability of the products (Lapar *et al.*, 2006). The bargaining power of the small producers is especially low since they have poor access to market information and limited access to financial markets that prevent them from selling their products at the most profitable period. Their lack of bargaining power may lead them to under-value their production and obtain a smaller share of the added value created in the commodity chain (Birthal *et al.*, 2005).

#### 2.6.2.6 Lack of economies of scale

Due to their challenges in production factors, especially land and capital assets, the small farmers cannot achieve economies of scale, even though they are advantageous for post-harvest, storage and processing activities (Bienabe *et al*, 2004). However their sizes can be of advantage when maintaining quality of produce because of their cost effectiveness.

#### 2.6.2.7 Lack of human capital

Small farmers are often illiterate, with poor technological skills, which can be a serious obstacle in accessing useful formal institutions that disseminate technological knowledge (World Bank, 2008). Hence, farmer training continues to be a central component of



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strategies to reinforce the managerial, financial, and negotiating capacities of farmers and their organizations (Bosc *et al.* 2003).

### 2.6.2.8 Lack of social capital

Social capital refers to social networks, institutions and associated norms of trust and reciprocity that underlie social relationships, and then the resources accessible to individuals because they belong to these social structures (Bienabe, *et al*, 2004).

Social capital ownership can give rise to more favourable exchange terms, transaction cost reductions, a wider range of options for coping with risks, through social networks and organizations (Birthal *et al.* 2005).

## 2.7 Review of Smallholder Farmers' Support Frameworks

In the history of South Africa, many associations, unions and cooperatives have been formed to assist its agricultural sector (Department of agriculture and Land Affairs, 2007). Before 1994, organizations such as the National Agricultural Farmers Union (NAFU) and policy initiatives such as Farmer Support Programme (FSP) had already been in existence (Department of Agriculture and Land Affairs, 2007). The Farmer Support Programme was established in 1996, initially to transform subsistence agriculture to commercial agriculture by assisting emerging farmers in acquiring land, finances, technical knowledge and farming machinery in South Africa's seven provinces except KwaZulu Natal and Western Cape (Agricultural Research Council, 2007).

The objective of FSP later changed towards promoting economic development by improving the welfare of farmers. NAFU was established in 1991 to assist resource-poor black farmers who were excluded from mainstream agriculture through support services and capacity building programmes (NAFU, 2005). Agri South Africa (AgriSA) is also one of the farmers' unions which were geared towards farmers' development. Formed as early as 1904, the Union asserts itself as the mouthpiece of as much as 70 000 large and small-scale commercial farmers in South Africa regarding their social and financial status (AgriSA, 2007).

In 2005, AgriSA and NAFU jointly formed a taskforce called the Farmer Development Trust (FDT) whose goal was to help ensure agricultural productivity and profitability amongst black farmers (AgriSA, 2005). After 1994, the new democratic government set up a number of initiatives to assist black farmers who were disadvantaged by apartheid. Although, the



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deregulation process meant in short, reduction in state support regarding marketing of agricultural products, it does not mean that farmers were completely neglected. There was continual and preferential support of smallholder farmers by the government. One of the outcomes of deregulation was the closure of agricultural marketing boards.

Subsequently, the National Agricultural Marketing Council (NAMC) was set up in 1997 and the Directorate: Marketing in the Department of Agriculture established in 2002, were to collaborate in resolving agricultural marketing matters (Department of Agriculture and Land Affairs, 2007). However, between the period 1997 and 2002, the Strategic Plan for South African Agriculture was adopted in 2001 to ensure sustainable resource management, global competitiveness and profitability as well as equitable access and participation in agriculture by all South Africans (Department of Agriculture and Land Affairs, 2007). In the same year 2001, the Land Redistribution for Agricultural Development (LRAD) programme was established to help the black South African population to acquire land for agricultural production purpose (Department of Agriculture and Land Affairs, 2005).

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

Although the government is making all these interventions, most agricultural institutions are still learning how to deal with the special circumstances and needs of emerging farmers (Development Bank of Southern Africa, DBSA, 2005). The result is that the National Department of Agriculture has all but lost direct control over the instruments and institutions with which it could possibly influence agriculture.

According to the DBSA (2005), it would be hard to argue that government policies and programmes to support smallholder agriculture in South Africa are sufficient when the current state of policies is either inimical to these farmers' interest or ignores them altogether. If agriculture is to make more of a contribution to poverty alleviation, the incomes



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of smallholder farmers will have to be raised, which requires promoting the growth of smallholder agriculture.

### 2.8 Impact of Commercialization on Smallholder Farmers

According to Ortmann and King (2006), in the agricultural economy, commercialization occurs when farmers stop being subsistence and become profit-oriented. There are two categories of agricultural *markets*, namely local and international. The local market mainly refers to buyers within the geographical area where the seller is located. In the case of this study this locality encompasses local Municipalities within Vhembe District, Limpopo Province and South Africa in general. The international market refers to buyers or consumers beyond the national geographic borders.

Critics of commercialization argued that smallholder farms will be left out of the commercialization process and would be unable to compete with increased market competition and prices falling. However, Sindi (2008) argues that studies claiming that commercialization of agriculture has mainly negative effects on the welfare of the poor were conceptually flawed, relied on potentially biased samples and ignored confounding factors that influence welfare.

In summarizing several studies where households switched from subsistence farming to commercialized system, the author found that with few exceptions commercialization of agriculture benefited the poor directly by generating employment and increasing agriculture labour productivity. Both the commercialized households and the households that provide labour to them achieve increased incomes.

According to Pingali *et al.* (2005) smallholder horticultural producers in rural areas market their produce in the local domestic markets. Therefore, production of horticultural crops has the potential to contribute to commercialization of rural economy, characterized by increased trade and marketing. Commercialization stimulates the rural economy and contributes to the growth and development process.

### 2.9 Transaction Costs Explained

Various definitions of transactions (sometimes referred to as market user costs) are found in literature. Transaction costs are referred to as the costs associated with the transfer, the capture and the protection of rights. This concurs with Van Der Hallen (2009) who reiterates that transaction costs are those costs that arise when individuals exchange ownership rights



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to economic assets, and enforce their exclusive rights. Makhura (2001) sees transaction costs as the costs of running the economic system.

Lapar *et al.* (2006) refers to transaction costs as the full costs of carrying out exchange. The author further argues that such costs include marketing costs. In support of this perspective the author propounds that transaction costs are associated with exchange, and includes informational costs of finding out price and quality of a product, its service records, its availability, the durability record, etc. The author further contends that such costs also include the costs of contracting and enforcing the contract.

Other viewpoints categories transaction costs according to the steps involved up to and including that moment when a transaction will be finalized. For instance Jaffee (2003) puts forward the following categories of transaction costs:

a. Search costs – These are cited as costs associated with identifying and contracting potential buyers and sellers, and the quality of resources in which they have property rights. Search costs like information costs and communication costs arise "*ex ante*" of exchange.

b. Bargaining costs – These involve costs of gathering information on the prices in other transactions, and on those factors that may influence the willingness to bargain by either party.

c. Monitoring costs – Monitoring costs include those costs associated with the monitoring of the contract agreement in order to ascertain that its conditions are fulfilled. Such costs occur "*ex post*" a transaction.

d. Enforcement costs – They are those costs incurred from enforcing an exchange agreement. They include the costs associated with default provision in a contract, for example, the collection of damages when partners fail to observe their contractual obligation. Enforcement costs occur "ex post" a transaction.

Jaffee (2003) classification included information costs, negotiation costs and monitoring or enforcement costs. The author categorizes transaction costs into search and information costs, bargain and decision costs, and policing and enforcement costs. The author further argues that all such costs represent loss of resources due to lack of or insufficient information which is usually common.

Although the above was an exploration of transaction costs in general, a list of relevant transaction costs that are affecting the exchange of agricultural and livestock products is



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non-exhaustive. The two additional categories of transactions that are incurred in marketing agricultural products include:

a. Transfer costs - These are referred to as the costs of marketing the services performed in physically handling the commodity and include transport, storage, retailing and wholesaling. Thus costs associated with transportation, risk attitude of farmers and all other administrative costs are included here.
b. Screening costs – They are inclusive of all the costs that are associated with collecting information on the reliability of a particular party, and the quality of the goods being transacted.

From the discussion above one can conclude that transaction costs involve, *inter alia,* the costs for searching for a suitable trading partner(s), screening the partners to ascertain their trustworthiness, bargaining with the trading partners in an attempt to reach an agreement and transferring the traded products.

### 2.9.1 Forms of Transaction Costs

Transaction costs can be categorized into classes, namely, observable and unobservable transaction costs (Makhura, 2001).

a. Observable (explicit) transaction costs include marketing costs, like transportation costs, handling, packaging and storage costs. Such costs have an observable impact on the magnitude of the trade.
b. Unobservable (implicit or inhibitive costs) transaction costs are inclusive of costs of information gathering, costs for searching, bargaining and screening suitable partners and costs for monitoring, coordinating and enforcing the exchange agreement.

The other delineation of transaction costs is based on the magnitude and/or levels of transactions made and are classified as, *Ex ante* fixed transaction costs and *Ex post* variable transaction costs (Nkori, 2004).

*Ex ante* fixed transaction costs remain the same regardless of the magnitude or level of transactions made. For instance, costs incurred when attempting to acquire information on finding a market would not vary, whether the magnitude of the produce one sells to the respective market changes or remains the same.



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On the contrary, *Ex post* variable transaction cost vary with the level or the magnitude of the transaction. Thus as more produce is transacted, the transaction costs will rise.

### 2.9.2 Sources of Transaction Costs

It is widely acknowledged that transaction costs emanate from the complexities of transactions. For instance in production, processing and marketing, transaction costs typically arise because marked prices do not fully reflect the true costs and returns to all market actors, who are embodied with an equal initial endowments and for whom market solutions may not be available (Nkori, 2004).

According to Makhura (2001), sources of transaction costs can be grouped into two classes, namely, those that are related to the physical details of the transaction, including transport, packaging or handling. The second class is of those arising from information asymmetries and contract enforcement problems, which cause economic agents to incur expenses that are associated with the information search, recruitment, coordination, supervision, management and litigation.

#### 2.9.2.1 Transaction costs related to the physical details of the transaction

The costs of transport features as the most prominent source of transaction costs. This is due to the fact that poor road networks, roads in poor conditions, lack of transport, as well as long distances from markets result in escalating costs for producers for their produce to reach the respective markets. Such high costs reduce the final return the producers will get from their produce (Nkori, 2004).

The nature of the product also determines the transaction costs of particular product and its derivatives. Smallholder farmers in Africa are mostly faced with high transaction costs in the production and marketing of agricultural products due to the nature of the products and of the institutional environment in which they have to operate. For instance, highly perishable commodities limit marketing options for smallholders in remote areas and imply greater losses due to spoilage than for low perishable commodities like grains. This is supported by Jaffee (2003) who propounds that high-value-for weight and high value-added tradable commodities, whose potential profitability has been enhanced by structural adjustment, are typically among those items with the highest associated transaction costs, for example, vegetables, fish and meat.



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### 2.9.2.2 Transaction costs arising from information asymmetries

Information asymmetry refers to that situation where prices do not fully reflect quality due to the fact that buyers and sellers do not have the same information. For smallholder farmers, information bottlenecks are aggravated by inadequate and poor information channels, as these become a huge hindrance to flow of up-to-date information about the markets, market prices and others. According to Ortmann and King (2006), when market information becomes asymmetric, it reduces activities like information searches, bargaining, monitoring, enforcement and protection of property rights, which are costly by nature, hence forcing hikes in transaction costs.

Drawbacks encountered from the monitoring and enforcement of a contract, such as the collection of damages arising from partners failing to observe their contractual obligations do result in transaction costs (Nkori, 2004). Such costs occur *Ex post* to a transaction, and are the costs that ensure the terms of a transaction are adhered to by the parties to the transaction. For instance, costs involved in the monitoring and enforcement of the terms of a transaction such as quality standards and/or the payment arrangements between two parties involved in a transaction are core in ensuring adherence to the transaction.

Smallholder farmers have low bargaining power, and that poses challenges for them in finding reliable markets for their products, hence another source of transaction costs. Makhura (2001) propounds that bargaining is crucial for acquiring the true position of contracting parties, more so in cases where prices (involving wages, interest rates and others) are not determined exogenously.

The enforcement and exchange of goods and products (wherein the latter may take the form of property rules or inalienate entitlement) typically involve costs. Transaction costs facing households in Africa, stem largely from structural aspects of the economic and political environment facing African producers, and that the absence of property rights and enforcement makes any form of contracting risky (moral hazard) and generally discourages commercial activities.

## 2.10 Theoretical Framework

Sadoulet and de Janvry (1995) proposed the basic theoretical exposition of effects of transaction costs on participation in a competitive market. In this theory, the authors showed how observed transaction (marketing) costs and unobserved transaction costs



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affect household sales and purchases (Fig 2.1). The basis of the theory is that transaction costs affect price, which in turn affects tradi output.

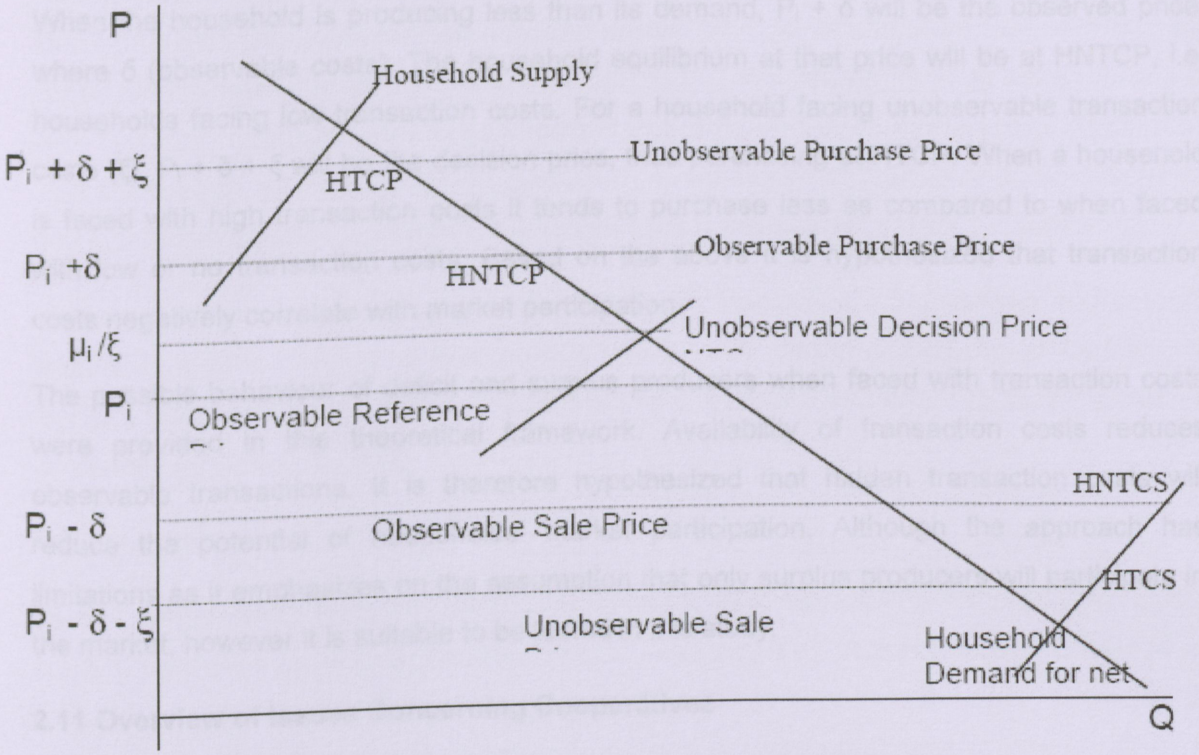


**Fig 2.1: How observed transaction costs (δ) and unobserved transaction costs (ξ) affect household sales and purchases**

**Adapted from: Makhura (2001)**

HTCS = sales by household facing high transaction costs

HNTCS = sales by household facing lower transaction costs

HTCP = purchases by household facing high transaction costs

The household producing surplus, and sells produce (food), will receive an observed sales price of $P_i - \delta$, where δ represent the marketing costs. The household will be able to sell HNTCS at that price, i.e. sales of a low transaction costs household. When more transaction costs are faced by the household (ξ), the unobserved decision price, $P_i - \delta - \xi$ corresponds to HTCS sales, i.e. sales of household facing higher transaction, which is less than sales of HNTCS. This implies that the higher the transaction costs, the less the household will sell.



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Based on above it is hypothesized that transaction costs negatively correlate with market participation.

When the household is producing less than its demand, $P_i + \delta$ will be the observed price, where δ (observable costs). The household equilibrium at that price will be at HNTCP, i.e. households facing low transaction costs. For a household facing unobservable transaction costs (ξ), $P_i + \delta + \xi$ will be the decision price, thus purchasing at HTCP. When a household is faced with high transaction costs it tends to purchase less as compared to when faced with low or no transaction costs. Based on the above it is hypothesized that transaction costs negatively correlate with market participation.

The possible behaviour of deficit and surplus producers when faced with transaction costs were provided in this theoretical framework. Availability of transaction costs reduces observable transactions. It is therefore hypothesized that hidden transaction costs will reduce the potential of households' market participation. Although the approach has limitations as it emphasizes on the assumption that only surplus producers will participate in the market, however it is suitable to be tested in this study.

## 2.11 Overview of Issues Concerning Cooperatives

### 2.11.1 Defining cooperatives

A cooperative is an autonomous association of people united voluntarily to meet their common economic, social and cultural needs as well as aspirations through a jointly-owned and democratically controlled enterprise (International Cooperative Association, 2005). The definition of cooperatives implies that they are characterized by the following: formed by groups of people with common need or problem; it is formed freely by members after contributing to its assets; formed and governed democratically so as to achieve desired objectives; and it is an independent enterprise promoted, owned and controlled by its members to meet their needs.

Simelane (2011) states that cooperatives are economic enterprises that are initiated by their members and belong entirely to their members. These enterprises are formed with the intention of providing the best possible services at the lowest possible cost to their members when markets fail to provide required goods and services at affordable prices and acceptable quality.



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Cooperatives vary greatly in terms of size and scale with regard to the functions they perform and can be formed in any sector of the economy. They can operate at all levels, that is, village, regional and national levels. According to Ortmann and King (2007) like all forms of businesses, cooperatives are also guided by a set of principles that were first set out by the Rochdale Society of Equitable pioneers in 1844. These following seven principles are universally applicable to all cooperatives: Voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training and information; cooperation amongst cooperatives; and concern for community.

These international cooperative principles form the nucleus of cooperatives and are not independent of each other. Cooperatives should not be judged exclusively on the basis of any one principle; rather, they should be evaluated on how they adhere to the principles as an entirety (Makhavhu, 2013).

### 2.11.2 History of Cooperatives

Farmer cooperatives were historically introduced in Sub-Saharan Africa (SSA) during the colonial period for promoting the production of cash crops by peasant farmers (Shiferaw *et al.* 2006). According to Ortmann and King (2007) after gaining independence, a number of governments, including donors, promoted cooperatives and other rural organisations as a potential source of decentralized grassroots participation in agricultural credit, input and commodity markets. Mixed performances were experienced due to technological problems and poor management.

Satgar and Williams (2008) indicate that cooperatives were generally controlled by government hence being considered as an extended arm of government and not as institutions that can help farmers in accessing markets as well as required inputs. These interferences by governments contributed to cooperatives poor performance. According to World Bank (2008), in the 1980s, the situation changed in the sense that economic liberalization opened up new opportunities for producers to be actively involved in organisations that they owned. This led to the reconsideration of the role of cooperatives in development despite past failures and bitter experience.

### 2.11.3 Rationale for the Establishment of Cooperatives

In most developing countries improvement in the ability of poor smallholder farmers to participate in markets is a serious challenge. According to Onumah *et al.* (2007), this



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problem is especially acute in the Sub-Sahara African region, given the dominance of smallholders in the agricultural sector. Evidence suggests that the proportion of farmers engaged in subsistence agriculture in this region is still high because of high transaction costs that inhibit them from participating in markets (Bernard *et al.* 2007). Smallholder farmers lack essential inputs and improved technologies preventing them from improving their production as well as participating in markets. Mostly in developing countries, development programme designed to develop smallholder farmers are unable to do so especially at the initial stages.

Sinja *et al.* (2006) state that the difficulties farmers face in accessing markets are inhibiting factors in improving their livelihoods and levels of production. Farmers who can produce a surplus are also unable to sell their produce because of a lack of access to profitable markets which then forces them to sell at the farm gate or to convenient buyers at any price that the buyer offers. Market supporting institutional arrangements such as farmer organisations, have been proposed as having the potential to bridge market imperfections and promote coordination in markets for enhancement of opportunities for the poor in markets.

According to Bernard and Spielman (2008), over the past decade, donors and governments have revived interest in collective action mechanisms to overcome smallholder marketing constraints as well as ensuring that the latter realize the perceived benefits. This is due to the fact that governments and donors have realized the usefulness of these organisations, especially as a medium for sustainable development. Hellin *et al.* (2007) indicate that the renewed interest is to a certain extent in response to changes that have occurred in the global agricultural economy, that have presented rural producers with both new challenges and opportunities. This is of significant importance, especially for high-value product farmers who are constrained by transaction costs.

Abdulai and Birachi (2008) report that because of these challenges, cooperatives and other farmer organisations were suggested as institutional innovations that can contribute to the development of production and marketing activities in the smallholder sector by enhancing market participation through collective action. They have been viewed as appropriate in reaching the poor smallholder farmers because of being owned and controlled by smallholder farmers when others have failed to do so. According to Negassa (2009) they present significant institutional change believed to change economic opportunities available



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to smallholder farmers by production improvement through better access to necessary inputs, better technologies and access to markets.

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## 2.12 Conceptual Framework of the Study

The approach followed in this study is illustrated in Figure 2.2. The first part of the work was aimed at proving that indeed there are vulnerabilities amongst smallholder mango farmers in South Africa, and specifically in Vhembe District of Limpopo Province. The study looked at the vulnerabilities and their possible causes and sources. The second part of the study focused on the characteristics of the smallholder mango farming sector, while study three looked at the quantity and quality of products from smallholder mango farmers, whether they are producing enough, of what quality and also the total wastage they are incurring each mango season.

The fourth study focused on the accessibility of markets by smallholder mango farmers: do they have any access to markets or not; the challenges they are encountering and also looking at the possible solutions. The fifth part analyzed the stakeholders (current and potential) actual and possible roles and the quality of participation. This was followed by the development of applicable methods for improved management of vulnerabilities experienced by smallholder mango farmers in Vhembe District. The last part of the study focuses on the dissemination and testing of the proposed framework and cooperative model.



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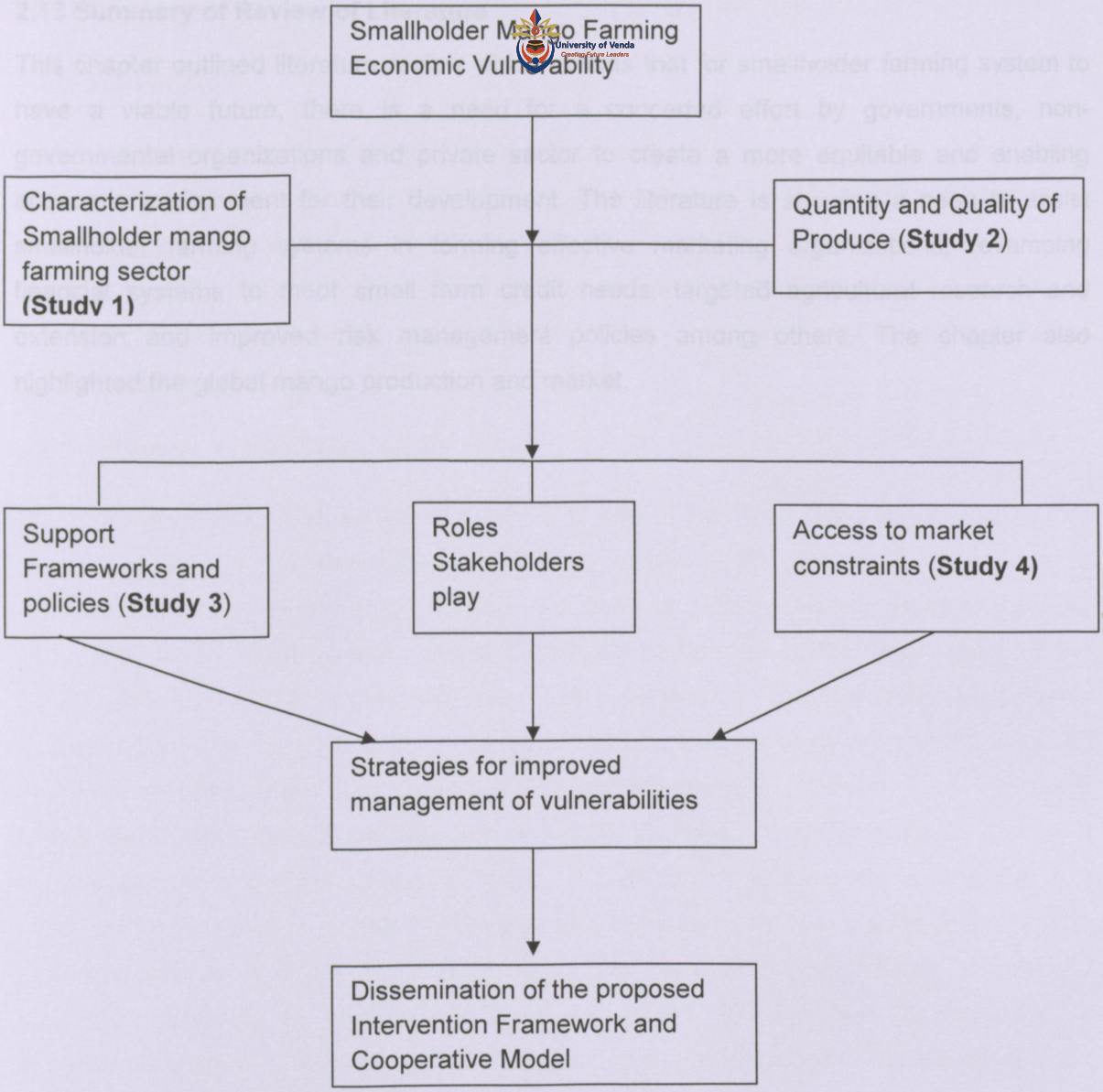


**Figure 2.2. Conceptual Framework of the study**



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## 2.13 Summary of Review of Literature

This chapter outlined literature review which reflects that for smallholder farming system to have a viable future, there is a need for a concerted effort by governments, non-governmental organizations and private sector to create a more equitable and enabling economic environment for their development. The literature is showing a need to assist smallholder farming systems in forming effective marketing organizations, revamping financial systems to meet small farm credit needs, targeted agricultural research and extension and improved risk management policies among others. The chapter also highlighted the global mango production and market.



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## 3.1 Introduction

Research methodology is the general approach chosen to carry out a study (Khothari, 2006). It dictates the particular tools the researcher applies. In this chapter, the research methodology of this study is outlined, covering the description of the study area, research design, population and sampling, data collection and analysis methods. Measures taken to deal with various ethical issues associated with the study are explained in relevant parts of the methodology.

## 3.2 Description of the Study Area

The study was conducted in Vhembe, which is one of the five District Municipalities that constitute Limpopo Province (Appendix 6). It is located in the northern part of Limpopo Province and shares borders with Mopani and Capricorn District Municipalities to the East and West, respectively. Botswana and Zimbabwe borders lie to the North West of the District while that with Mozambique is found to the South East. Vhembe District Municipality was established in the year 2000, in terms of the Local Government Municipal Structures Act 177 of 1998. Taking into account the specifications in Section 4 of the Local Government Municipal Structures Act of 1998, Vhembe is a Category C, Grade 4 Municipality. According to Crythorne (2006) a Category C Municipality is one that has executive and legislative authority in an area that includes more than one municipality. The District is comprised of four local municipalities; these are, Thulamela, Mutale, Musina and Makhado (Appendix 7). It covers a total area of 21 407 $km^2$ with a population of approximately 2 million (StatsSA, 2013). The coordinates of Vhembe District Municipality are 22.9333°S, 30.4667°E. About 99 % of the District is rural with approximately 335 280 households (VDM IDP, 2012 – 2017).

According to StatsSA (2013), the proportion of males to females is 84:100 females in the District is 84 %. Seventy five percent (75 %) of the population is 35 years old and below. Eighteen percent of the population had no formal education, while 22 % completed grade 12 and 10 % had tertiary education. The district had an average population density of 51 people per $km^2$. This is 12 more people per $km^2$ than the Limpopo Province in general and 19 more people per $km^2$ than in South Africa as a whole. All this is attributed to a high population concentration within Thulamela of 180 people per $km^2$. Makhado had 53 persons



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per km$^2$, while Mutale had 32 and Musina only 5 persons per km$^2$ (VDM LED Strategic Plan, 2007). A large portion of Vhembe District people (57 %) were reported to be in the economically active age group of 29 to 64 years. Community services (22 %), trade (14 %) and mining (1 %) anchored the economy of Vhembe District.

The climate of Vhembe District is typically sub-tropical, with mild, dry winters and wet, warm summers. The agro-climatic conditions of Vhembe District promote growth of sub-tropical and tropical fruits such as mangos, litchis, papaya, avocados guava and citrus. Hence, it is pronounced the fruit basket of Limpopo Province. Vhembe and Mopani Districts are the leading producers of mangos in South Africa. Vhembe District has 4123 Ha of land under mango production (LDA, 2009). Mango production in Vhembe District is mainly concentrated in Thulamela and Makhado Local Municipalities, with insignificant activities in Mutale and Musina Local Municipalities. The bulk of the mangos are produced by smallholder farmers, using low external inputs production systems resulting in low production, high postharvest losses and insignificant market participation.

### 3.3 Research Design

Research design refers to a framework prepared for use in conducting a study. It details the procedures necessary for obtaining the information needed such as sampling methods, data collection tools and related methods of analysis (Kumar, 2008). Exploratory, descriptive and causal are some of the different types of research design available. Leedy and Ormrod (2005) define an exploratory research as a study conducted in order to get a better understanding of a situation but not to come up with final answers or decisions. While descriptive research places special emphasis on determining the frequency with which something occurs or the extent to which two variables covary. Exploratory and descriptive studies combine both qualitative and quantitative research methods.

This study sought to fill gaps in information and knowledge relating to the socio-economic characteristics, contributions and challenges (i.e. production, processing and marketing) of smallholder mango farming system. Thus, it mixed exploratory and descriptive design attributes. Qualitative and quantitative research methods were also used through unstructured and structured questionnaires. An exploratory study was considered because of the need to build evidence on the production, processing and marketing activities of smallholder mango farming system in Vhembe District Municipality. Results from this type of study were regarded as crucial with respect to making available scientific information about



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the characteristics of smallholder mango farming system in the district and the intervention decisions that could assist them.

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### 3.4 Population and Sampling Procedures

The population of this study was comprised of Local Economic Development Officers, Mango Processors, Extension Officers, Fresh Produce Markets Agents, Mango consumers and smallholder mango farmers from Thulamela, Makhado, Mutale and Musina Local Municipalities. According to Babbie (2012), a population is an aggregation of elements from which the sample is selected.

In this study simple Random sampling was used to select the smallholder mango farmers and mango consumers in order to obtain the opinions of the targeted groups. Smallholder mango farmers were selected from villages where high activities of mango farming were taking place. One hundred and fifty two (152) of both male and female farmers were selected. Two hundred and sixty one (261) mango consumers in Vhembe District in Limpopo Province constituted the population.

The selected respondents had similar characteristics that provided rich and relevant information required to answer the questions that underpinned the study. These characteristics included the fact that they were all residing within Vhembe District Municipality, mango consumers and familiar with the mango cultivars common in Vhembe District.

### 3.5 Data Collection Methods and Techniques

Both primary and secondary data were collected from various sources. Journals, books, publications, reports and government documents were sources of secondary data. Primary data were collected using qualitative and quantitative methods. Key Informant Interviews (KII) and focus group discussions were used to collect qualitative data. Focus group discussions were preceded by the key informant interviews which were conducted with Local Economic Development (LED) Officers, Mango processors, Limpopo Department of Agriculture officials and Fresh Produce Market agents.

Focus group discussions were constituted of Limpopo Department of Agriculture Extension Officers, Mango Commodity Association Executive committee and smallholder mango



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farmers. Three mixed groups of both male and female drawn from the three stakeholders were formed. The following questions were used to guide the focus group discussions:

a. What makes one qualify to be called a smallholder mango farmer?

b. What does livelihood mean?

c. What does smallholder mango farming contribute to rural livelihoods or the local economy in Vhembe District?

d. What challenges do smallholder mango farmers face in production, processing and marketing?

e. What causes the challenges that the smallholder mango farmers face?

f. What must be done (and by whom) in order to solve the problems that smallholder mango farmers face?

g. As one of the stakeholders of smallholder mango farming, what do you regard as your role(s) in addressing the challenges faced?

Trained University of Venda students co-facilitated the focus group discussions. Each focus group was requested to select a chairperson and a rapporteur in order for it to be able to record its perceptions. Each group was expected to record each perception using markers on the provided flip charts after reaching a consensus on such a perception as a group. All the Flip charts were labeled, with each group's identification details and composition clearly shown. The research assistants collected all the Flip charts and stored them for processing of the qualitative data.

The collected data were consolidated and summarized before being organized into sub-themes. The results of this second phase of the study were used to construct a face-to-face interview questionnaire of close-ended questions. The questionnaire was administered to 152 randomly selected smallholder mango farmers. Vhembe Mango Commodity Association and Department of Agriculture Extension Officers were requested to identify and invite the participants (smallholder mango farmers). This responsibility was assigned to the two groups based on the assumption that they had better knowledge of smallholder mango



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farming system within the district. Thus they are better placed to select the most suitable participants.

This was done to also stimulate the sense of ownership of the study to these two groups, hence full participation of the targeted participants. The questions required responses on a modified 10 point Likert scale, ranging from 1 (strongly disagree) and 10 (strongly agree). Each questionnaire took at most 45 minutes to administer to each respondent.

In the case of Mango consumers, quantitative data were collected using a face-to-face interview questionnaire of close ended questions. The questionnaire was administered to 261 randomly selected mango consumers. Each questionnaire took at most 20 minutes to administer to each respondent.

Ethical standards were adhered to during the data collection process. This was based on the reason that data should not be obtained while simultaneously violating the protection and privacy of human beings. It was important to ensure that all participants were aware of the general arrangements of the study. Approval to conduct this study was granted by the Ethics Committee of the University of Venda. Permission to access the participants was obtained from the Limpopo Department of Agriculture (LDA).

Information about the aim of the study, procedures to be followed and obligations of the researchers were explained to the participants. The questionnaire was administered in English, Tshivenda and Xitsonga. Respondents were given complete information to enable them to comprehend fully the investigation. All the respondents were asked to sign a consent form before data collection. This was done after it was thoroughly explained to them what signing the consent form meant. Respondents were promised that all the data would be kept confidential and their identities would also remain anonymous.

### 3.6 Data Analysis

Data analysis is defined as a process of inspecting, cleaning, transforming and modelling data with the goal of highlighting useful information, suggesting conclusions and decision making. De Vos *et al.* (2005) state that it is a process of bringing order, structure and meaning to the mass of collected data. In this study, qualitative and quantitative data were analyzed separately. The methods and techniques used to analyse the data are explained below.


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Qualitative data were analyzed using the Hennink, van Rensburg and Smit (2004) methods of content analysis. According to Neuman (2007), content analysis involves gathering and analyzing textual material, which encompasses words, meanings, pictures, symbols, ideas, themes or any message that can be communicated. When analyzing the qualitative data the following steps were followed. Key ideas were compiled from recorded messages and compiled notes. Information of importance was selected and presented in the form of tables and figures.

Quantitative data were cleaned, coded, captured and stored as Microsoft Excel spreadsheets. Data were then imported into the Statistical Package for Social Sciences (SPSS) version 22.0 for analysis (2012). Descriptive statistics for non-parametric variables were computed. This was mainly in the form of cross tabulation and frequencies. Means of scores for each of the perceived definitions of smallholder farmer, contribution of smallholder mango farming to rural livelihoods, challenges smallholder mango farmers faced, perceived causes of the challenges and suggested solutions were obtained.

### 3.7 Research Methodology for Physico-chemical characteristics of mangoes

Ripe fruits of Sensation, Kent, Keitt, Heidi and Sugar (standard/control) cultivars were purchased from commercial and smallholder mango farmers in Vhembe District. The fruit samples were brought to the laboratory at the Department of Food Science and Technology, University of Venda, South Africa. Ten fruits of each cultivar were stored at room temperature (25 °C) for 10 days to ensure that they reached the proper maturity level for processing. During the ripening process, daily weight loss was recorded using the mass balance scale. When fully ripe, TSS, texture, pH, and TA tests were performed as per standard analytical methods discussed below.

#### 3.7.1 Pulp Extraction, Processing and Storage

Ripe fruits were peeled with stainless steel knives, cut and blended using a laboratory blender (Blender 8010S, Model HGBTWTS3, USA) into a homogenized pulp. The pulp was packed in polythene bags and appropriately labeled. The bags were stored in a cold room at 4 °C, conditions as recommended by Akhtar *et al.* (2010), for further analysis.



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### 3.7.2 Estimation of Total Soluble Solids

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Total Soluble Solids in each sample were determined using an Automatic Refractometer (Atago automatic, SMART 1, Model 1620, Atago Co. Ltd, Japan). A refractometer reading was taken from two drops of a thoroughly mixed sample as described by Association of Official Applied Chemists (AOAC, 2000). The results were reported as degree Brix (°Brix).

### 3.7.3 Measurement of Titratable Acidity (TA)

Titratable Acidity was measured through titration against NaOH, using phenolphthalein as an indicator. The results were expressed as % citric acid following standard methods (AOAC, 2000). The following equation was used in the calculation of % citric acid

% citric acid = V x N x Wmeq x 100/Y, where:

V = ml of NaOH solution used for titration,

N = Normality of NaOH solution

W = Milli-equivalent of citric acid of 0.064 and

Y = Sample weight (g).

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### 3.7.4 Measurement of pH and Texture

For each cultivar, 15 g of the fruit sample was used. A digital Mettler–Tolegdo pH meter, LE 407 Model, Switzerland was then used to measure the pH of the fruit samples. All the measurements were done in triplicate.

In order to determine its texture, each fruit was peeled at two points in the middle (equatorial) area. Thereafter, a texture analyzer was used.

At the ripe stage, when the skin and pulp colour had changed, shape, skin colour, pulp colour and presence of fibre were recorded. This was done through sensory evaluation that relied on score cards and trained panellists. A group of 8 panellists comprised of 3 males and 5 females from the Department of Food Science and Technology at the University of Venda. They helped with the evaluation of mangoes from large-scale commercial and smallholder mango farming systems. They were each given 8 mangoes, that is, four cultivars from each farming system and given a quality rating score card for evaluation of skin colour, fruit shape, pulp colour and fibre presence.



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### 3.7.5 Statistical Analysis of Data

The data were statistically analysed using two–way analysis of variance (ANOVA) to determine whether there was significant statistical difference in the physico-chemical quality parameters of the tested mango varieties in commercial and smallholder mango farming systems were different. The Statistical Package for Social Sciences (SPSS) version 20.0 was used for analysis. Posthoc tests were carried out using the Tukey range test to assess the difference between means at $P < 0.05$ significance level. The following equation was used in the calculation of two-way analysis of variance (ANOVA)

$$y_{ijk} = \mu + F_j + V_k + (FV)_{jk} + \Sigma_{ijk}$$

where $\mu$ = the grand mean, $F_j$ is the treatment effect for the jth category of the row variable, $V_k$ is the treatment effect for the kth category of the column variable, $(FV)_{jk}$ is the interaction effect for the combination of the jth row category and the kth column category.

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## 4.1 Results

In this chapter the findings of the study on the characteristics of smallholder mango farming system in Vhembe District Municipality are described. This includes the perceptions of smallholder mango farmers on the contribution of farming to rural livelihoods; challenges faced and suggested causes to challenges.

### 4.1.1 Demographic Characteristics of Smallholder Mango Farming

The findings of this study revealed that approximately 59 % of the smallholder mango farmers were male. Most of the farmers had attained primary (47 %) or secondary (36 %) school education. About 16 % of them had tertiary qualifications, while the remainder did not receive formal education. Approximately, 86 % of the mango farmers were at least 50 years old. Those who were 40–49 years old constituted about 7 %. The remainder was 21–39 years old. The modal family (57 %) size was 4–6 members. About 36 % of the smallholder mango farmers came from families that had 7–9 members. The largest families had 10–12 members (6 %), with the rest having 1–3 members. It was revealed that in about 60 % of the households, there were 4–6 members involved in mango farming activities.

### 4.1.2 Farming type, Land size and Mango varieties

Approximately, 71 % of the respondents classified smallholder mango farming as that which takes place on land of less than 2 Ha, producing low volumes and having limited access to markets. Another view (61 %) was that this referred to agricultural activities presided over by farmers relying on inadequate equipment, funds and land. It was observed that smallholder mango farming was predominantly dryland (89 %). About 7 % of the farmers irrigated their mangos while the rest practiced a combination of irrigated and dryland farming.

The majority of respondents (61 %) reported that their farms were up to 2 Ha, while 14 % had 3-4 Ha. Fourteen percent of respondents were farming on 5-6 Ha of land and less than 10 % of farmers indicated that their farms were 6 Ha and above. Sugar mango (non-commercial cultivar), Sabre, Tommy Atkins, Sensation, Kent, Keitt and Heidi were the dominant mango varieties. Sixty-one percent of the respondents reported that they produced Sugar mango because unlike other varieties spraying and irrigation were not



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needed. About 39 % of the farmers had Sabi, Tommy Atkins, Kent, Sensation, Keitt and Heidi cultivars.

There were variable levels of income derived from smallholder mango farming. About 56 % of the farmers indicated that they received between R1 000-5 000 during the 2011-2012 mango harvesting season, while 24 % got incomes ranging from R5 100-10 000. Another 9 % of the farmers indicated that their incomes were R10 100-20 000 in the same season. The remaining farmers reported that they received at least R50 000 and above.

### 4.1.3 Socio-economic Characteristics of Smallholder Mango Farming

The results similarly revealed other areas of inequalities in the smallholder mango farming sector and the serious constraints that this segment of the farming system still faces. For instance, the results showed that all respondents in this study do not own the land they are occupying. They have no title deeds but Permission to Occupy (PTO). There is also an overwhelming need for credit by respondents (95 %) as shown on Table 4.1. Actually, only 19 % of the smallholder mango farmers received some form of financial assistance (credit) in 2012. This situation is probably linked to failure by large number of smallholder farmers (93 %) to apply fertilizers to their trees.

Farmers in this study were asked whether or not they were attending workshops. The results in Table 4.1 showed that farmers attending workshops significantly outweighed those who did not attend (37 %). More than half of the farmers (59 %) in this study indicated that they were getting extension services. However, 41 % were not receiving extension support. The consequences of the previously mentioned constraints seemed to be that only 41 % of the farmers' produce were able to be marketed. As shown in Table 4.1, the majority of smallholder mango farmers (73 %) were constrained by insufficient access to infrastructure and information, with many of them lacking the assets to expand productive activities.

It was also noted that more than half of the respondents had a long-term commitment to farming, with 53 % of them having prepared long-term farm plans during 2012 or earlier. Out of 152 smallholder mango farmers interviewed, only 31 farmers (20 %) indicated that they had no other sources of income (Table 4.1). Most of the smallholder farmers in Vhembe Municipality were not members of the South African Mango Growers Association (SAMGA) as only 45 % were members of SAMGA. The results showed that 45 % of farmers had access to price information from SAMGA and they used different modes of communication



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to acquire information regarding prices for their products. The results showed that only 20 % of the farmers were guaranteed the market in 2012/2013 mango season from Empack Processors and Valley Farms Processors.

### 4.1.4 Contribution of Smallholder Mango Farming to Rural Livelihoods

The perceived contribution of smallholder mango farming to rural livelihoods in Vhembe municipality could be categorized into the following sub-themes: socio-economic development, family support, growth and development. The most commonly identified contribution of smallholder mango farming was said to be socio-economic development. Most of the smallholder mango farmers (84 %) reported that their farms provided jobs for other community members and helped to reduce crime and poverty within their communities. While 83 % also reported that their farms created jobs for themselves.

In relation to family support, growth and development, 71 % of the respondents indicated that money generated through smallholder mango farming was used to pay school fees, buy groceries and build homes. About 74 % of the respondents claimed that smallholder mango farming enhanced food security in rural households by providing nutritious foods. Slightly over a third (40 %) of the smallholder mango farmers' reported out that their farms' income contributed to local economy through payment of taxes.

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**Table 4.1: Socio-economic factors for sampled smallholder mango farmers**

| Modelled variable | Frequency | Percentage (%) | Ranking |
|---|---|---|---|
| Land ownership (P.T.O) | 152 | 100 | 1 |
| Credit need | 145 | 95 | 2 |
| Work shop attendance | 95 | 63 | 3 |
| Extension services | 91 | 60 | 4 |
| Unsold produce | 90 | 59 | 5 |
| Farm planning | 81 | 53 | 6 |
| Information availability | 72 | 47 | 7 |
| SAMGA membership | 68 | 45 | 8 |
| Access to price information | 68 | 45 | 9 |
| Infrastructure availability | 41 | 27 | 10 |
| Non-farm employment | 31 | 20 | 11 |
| Market guaranteed in 2012 | 30 | 20 | 12 |
| Credit access | 29 | 19 | 13 |
| Fertilizer use | 10 | 7 | 14 |

**Source: Field Research (08/2013)**



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## 4.2 Discussion

### 4.2.1 Gender Distribution amongst Smallholder Farmers

The smallholder mango farmers who participated in this study were predominantly men (59 %). This concurs with the results of a study in the Kat river valley in Eastern Cape Province, South Africa. In the study, Jari and Fraser (2009) observe that men constitute 58 % of the people involved in smallholder farming. In Kenya, Ndambiri *et al.* (2012) studied the socio-economic and institutional constraints to accessing credit among smallholder farmers in Nyandarua District and observe that 87 % of the smallholder farmers were men.

The slight difference in numbers between male and female smallholder mango farmers in this study implies that any development plan for the smallholder mango farmers in Vhembe District Municipality will benefit both males and females. It can be concluded that in Vhembe District both males and females practice smallholder mango farming.

### 4.2.2 Distribution of Respondents by Age

In agriculture, age is important, for it determines the experience the farmer has in a certain type of farming. Ngqangweni and Delgado (2003) report that the household head's experience influences farming activities of household members since they rely on him/her for guidance. In this study, the majority (80 %) of the respondents fall in the age range of between fifty and sixty nine years (Table 4.1). This was in line with the findings of studies conducted in Limpopo Province (Makhura, 2001) and Nkonkobe Municipality in Eastern Cape Province (Pote, 2008), whereby most of the smallholder farmers were about fifty seven years of age. Table 4.1 shows that an insignificant number (5 %) of farmers are below forty years of age, this demonstrates that farming is dominated by old people. It can be concluded that youth are not seeing farming as a better source of income compared to other forms of employment.

### 4.2.3 Educational Level of Respondents

In this study, it was observed that the majority (98 %) of the farmers had formal education, whilst only 2 % had no formal education. This concurs with the findings of Oni, Maliwichi and Obadire (2011) in their study on socio-economic factors affecting smallholder farming and household food security in Thulamela Local Municipality of Limpopo Province in South



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Africa. They reported that 98 % of the smallholder farmers in their study had formal education.

In Ghana, Dzadze *et al.* (2012) in their study on factors determining access to formal credit by smallholder farmers in the Abura-Asebu Kwamankese district, reported that of the 100 respondents they surveyed, 76 % had formal education. According to Jari and Fraser (2009), educated people are more able to interpret information than uneducated people. Presumably, the authors argue that education levels affect interpretation of market information and hence, market participation level of farmers.

### 4.2.4 Household Size

The number of people in a household in this study ranged from three to twelve. The findings of this study revealed that more than half (57 %) were average households with four to six members (Table 4.1). This is a common feature among the rural households, whereby the household's size is usually large as opposed to the urban setting. Other studies in Kenya and South Africa revealed a similar household pattern (Ndambiri, *et al.*, 2012 and Oni, *et al.*, 2011). According to Makhura (2001), household size has an influence on marketing since it affects consumption and production. The larger the household, the lower the selling because it needs to supply its consumption before it decides to sell.

### 4.2.5 Farming Type

In the surveyed area, smallholder mango farmers are practicing three different farming systems, namely: dryland, irrigation and a combination of both dryland and irrigation. The majority of farmers (89 %) indicated that they are practicing dryland farming due to lack of water and irrigation infrastructure in their farms. This concurs with findings of the study by KojoAihoon *et al.* (2009), who observed that smallholder farming in South Africa is characterized by among others, small farm units and lack of infrastructure including water supply, electricity and transport network. The above observations find support from Tshikhudo (2005) who argues that smallholder fruit producers in former Venda (which includes Vhembe District Municipality) should be encouraged to practice irrigation farming to supplement rain water in order to increase their fruits yield.



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### 4.2.6 Land Size

Globally, land size seems to be a general characteristic of smallholder farming. Birthal and Joshi (2006) reported that in India, 86 % of the 101 million farm households had land holdings of less than or equal to 2 Ha. Dzadze *et al.* (2012), report that in Ghana, the agricultural sector is predominantly made up of smallholder farms of less than 2 Ha farm sizes and comprises 90 % of the sector. The findings of this study are in line with the above observations as the majority (61 %) of the respondents reported that they had farm units of less than or equal to 2 Ha.

### 4.2.7 Mango Varieties

In South Africa, the most important commercial mango cultivars grown are: Tommy Atkins, Sensation, Kent, Keitt, Heidi and Zill (DAFF, 2011). According to DAFF (2011) approximately 84 % of mango production is under irrigation as dryland production is no longer encouraged, unless there is enough annual rainfall to supplement the irrigation programme. This is in contrast with the findings of this study where 61 % of the respondents had planted Sugar mango (indigenous cultivar) and practicing dry land farming system.

The respondents indicated that they preferred the non-commercial cultivar because it does not need spraying and irrigation like the commercial cultivars. This confirms what Tshikhudo (2005) reports in his study on irrigation and dryland fruit production: there are constraints faced by small-scale farmers in Venda, and these farmers tend to select drought tolerant or resistant cultivars in order to avoid production costs such as pesticides, fertilizers and supplemental water.

Thirty nine percent of the respondents had Tommy Atkins, Kent, Sensation, Keitt and Heidi but also under dryland production system. These findings bring out a conclusion that mangoes from smallholder farmers in Vhembe Municipality are of inferior quality to those from commercial farmers.

### 4.2.8 Farming Income

The smallholder mango farming income was considerably variable due to lack of proper recording of inputs and outputs sales. This was reflected in the high number of respondents (70 %) who indicated that they are earning a total income of less than R10 000.00 in a mango season, while only 8 % of the farmers earned between R50 000.00 and R150



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000.00. This concurs with the results of the study by Oni *et al.* (2011), where 68 % of the respondents earned a total income of less than R10 000.00, while 2 % earned between R51 000.00 and R100 000.00 as income from their farming activities.

### 4.2.9 Land Ownership

Worldwide smallholder farmers are faced with land problems. The main challenges are size and ownership of the land. South Africa in particular has two ownership methods, that is, Title deed and Permission to Occupy (PTO). With the title deed method, farmers have full ownership of the land, while PTO method does not give full ownership of the land to the farmer. Under the PTO system, farmers are farming on the land through communal permission. Table 4.1 shows that 100 % of the smallholder mango farmers interviewed do not own the land but have permission to occupy status.

According to Randela (2005), land ownership can influence farm productivity since farmers without land ownership can be reluctant to develop and maintain it. Furthermore, this can affect such farmers when they are applying for credits since they cannot use land they do not have ownership for as collateral (Makhura, 2001). The above situation has a link with the failure by the majority of the respondents (81 %) to secure credits from financial institutions, while there was an overwhelming need for credit by them, estimated at 95 %.

### 4.2.10 Farmers' Organizations

In Vhembe Municipality, farmers have organized themselves into commodity associations. These associations are divided according to the different agricultural commodities produced within the district and are led by commodity executive committees. The mango commodity association is part of the main subtropical fruits commodity association and is affiliated to the South African Mango Growers Association (SAMGA). Forty five percent of the respondents in this study are members of this association. The farmers who are members of the mango commodity association in Vhembe municipality cited that the organization is providing them with market information.

The affiliated farmers indicated that their organization also organizes government and private extension services for them, hence an improvement in production and marketing in their farms. This argument is substantiated by Randela (2005), who indicated that when a producer cannot individually enjoy economies of scale, farmer organizations are important in



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linking producers with markets. However, reluctance from more than half of the respondents (55 %) to join these organizations affect production and market participation because they are not receiving the information which members of these organizations are receiving.

Jari and Fraser (2009) in their study on an analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in Eastern Cape Province, South Africa, also concluded that, it is difficult for smallholder farmers to compete with commercial farmers in markets and to get contractual agreements as individuals, owing to a small marketable input. Therefore, co-operatives and group marketing arrangements can be beneficial institutional innovations.

### 4.2.11 Contribution of Smallholder Mango Farming to Rural Livelihoods

In developing countries, smallholder farming is recognized as an important contributor to employment and income generation. In India, smallholder farming constitutes more than 80 % of the agriculture sector, and contributes 57 % of total employment (Birthal and Joshi, 2006). According to the FAOSTAT (2011), in Ghana, agriculture creates employment for 55 % of the population. In South Africa, the contribution of agriculture is significant. Statistics South Africa (StatsSA, 2013), reports that the agriculture sector was the main contributor to the slight increase in employment during the last and first quarters of 2012 and 2013.

The preceding information concurs with the findings of the present study, where job creation for smallholder mango farmers and other people in need, was perceived to be the most common contribution of smallholder mango farming. A large proportion (82 %) of smallholder mango farmers revealed that during harvesting they employ an average of 3-5 workers in their farms. This is because mangoes like other horticultural crops are labour intensive during harvesting (Weinberger and Lumpkin, 2007).

The fact that more than two thirds (71 %) of the smallholder mango farmers indicated that they use the money they generate through mango sales to pay school fees for their children and buy groceries is worth applauding. This justifies the importance of providing support to smallholder mango farmers for their growth and development. Through farming, smallholder mango farmers sustain themselves and their families.

Food security was identified as another contribution of smallholder mango farming to rural livelihoods. According to FAOSTAT (2007), food security is a situation that exists when all



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people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Dzadze *et al.*, (2012) support this assertion by pointing out that smallholder farmers constitute the larger percentage of food producers, therefore efforts aimed at increasing food production should focus on them. Smallholder farming also improves household nutrition indirectly through provision of money for buying high energy foods, fruits and vegetables (van Averbeke and Khosa, 2007).

In the current study in Vhembe district, 40 % of the smallholder mango farmers pointed out that they are contributing to the Gross Domestic Product (GDP) of the country through their farms' income. Although it is not clearly divided into smallholder and commercial farming like in other developing world countries, agriculture is contributing 14 % to the South African GDP (StatsSA, 2009). With over 4 million smallholder farmers in South Africa, if well-coordinated and supported, smallholder farming can be a potential source of government tax revenues through sales and licensing fees (Title deeds). These findings indicate that smallholder mango farming contributes to a multiple range of aspects of rural livelihoods, which highlights the need for devising a comprehensive strategy for supporting and strengthening it.

### 4.3 Conclusions

The current study highlighted various ways in which smallholder mango farming sector contributed to rural development. Among these were socio-economic development; family support, growth and development, and service provision. Most smallholder mango farmers reported that their farms contributed towards job creation for themselves and others. The income generated from selling their produce was also used to pay school fees for education and training and also purchasing various household basic needs. Its contribution to the reduction of food insecurity in rural communities is crucial in rural development relief.



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## 5.1 Results

### 5.1.1 Challenges Facing Smallholder Mango Farming

The challenges smallholder mango farmers perceived to be facing could be subdivided into: production, processing and marketing challenges. Table 5.1 highlights the production challenges farmers perceived to be hindering their growth to reach the level of commercial farming. The results revealed that lack of on-farm infrastructure like irrigation systems was ranked first as one of the biggest challenges facing smallholder farming. The respondents reported that lack of on-farm infrastructure affects quality of their produce. Lack of technical skills is another production challenge as revealed by the results. The table revealed that the respondents agreed that lack of technical skills, such as pest control, pruning and fertilization continued to threaten good production in their farms.

Considerable losses of produce mainly due to rotting in trees and on farms due to lack of postharvest facilities have also been reported as another production challenge. Considerable losses mainly due to rotting was ranked 5$^{th}$; respondents reported that they are losing more fruits due to rotting than what they are selling. Other noticeable production challenges faced by smallholder mango farming included inadequate land for farming (ranked 7$^{th}$); poor quality of products due to high production costs; unavailability of commercial cultivars (ranked 9$^{th}$) as well as natural disaster. The least ranked challenges under this category were: "natural disasters such as drought or excessive heat", "theft of farming implement and produce" and "inadequate labour."

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**Table 5.1: Ranked means for production and processing challenges smallholder mango farmers faced**

| Perceptions | Mean | Standard deviation | Ranking |
|---|---|---|---|
| a) Lack of on-farm infrastructure (e.g. irrigation systems) | 9.2 | 1.48 | 1 |
| b) Lack of farming implements/equipment | 9.1 | 1.28 | 2 |
| c) Lack of technical skills (e.g. pest control, pruning, fertilization) | 9.0 | 1.67 | 3 |
| d) Lack of financial support to buy inputs | 8.9 | 1.25 | 4 |
| e) Considerable losses mainly due to rotting | 8.7 | 1.60 | 5 |
| f) Pests that attack the mangoes before harvesting | 8.7 | 1.54 | 6 |
| g) Not enough land for farming | 8.4 | 1.79 | 7 |
| h) Poor quality of products due to high production costs | 8.4 | 1.45 | 8 |
| i) Unavailability of commercial cultivars | 8.1 | 1.99 | 9 |
| j) Natural disasters such as drought or excessive heat | 7.9 | 1.58 | 10 |
| k) Theft | 7.2 | 2.15 | 11 |
| l) Inadequate labour | 7.2 | 1.94 | 12 |
| **Processing** | | | |
| a) Lack of facilities for processing | 9.6 | .76 | 1 |
| b) Lack of finance to buy processing facilities | 9.6 | .74 | 2 |
| c) Inadequate technical knowledge and skills relating to mango processing | 9.5 | .96 | 3 |

**Source: Author's Calculations Using SPSS (09/2013)**



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With respect to processing challenges, lack of processing facilities was ranked first as a hindrance to processing and value addition to their farm produce. Lack of finance to buy processing facilities was ranked second. The respondents indicated that inadequate technical knowledge and skills relating to mango processing prevents them from processing their mangoes. Table 5.1 presents the ranked mean scores of the processing challenges that smallholder mango farmers faced.

In terms of marketing (Table 5.2), not having a shareholding in the lucrative markets was identified as a problem hindering participation of farmers in markets. Ninety six percent of respondents reported that they do not have a shareholding stake in the lucrative markets. Respondents believed that the fact that most of them could not be represented in the markets meant that their produce were discriminated against. Long distance between farms and markets was ranked second and respondents complained that it is hindering them from selling their produce. While a market that discriminates small-scale mango farmers was ranked third, respondents reported that produce from commercial farmers were favoured over their produce.

The distance between the farms and markets were reported to be increasing the costs of getting fruits to the market. Ninety percent of the respondents reported to experience high costs of getting their fruits to the markets. Poor road infrastructure between the farms and lucrative marketing centers has been identified as another challenge hindering selling of produce to markets.

Other noticeable marketing challenges facing smallholder mango farming included: "inability to maximize opportunities that the value chain presents (ranked 7$^{th}$)", "products that are of poorer quality compared to those of competitors (8$^{th}$)", "mainly producing varieties that are not so much in demand (9$^{th}$)", and "lack of knowledge of the commodity value chain (10$^{th}$)". The least ranked challenges were: "lack of markets", "lack of marketing facilities" and "lack of knowledge of the value chain".



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**Table 5.2 Ranked means for marketing challenges smallholder mango farmers faced**

| Perceptions | Mean | Standard deviation | Ranking |
|---|---|---|---|
| a) Not having a shareholding stake in the lucrative markets | 9.6 | 7.38 | 1 |
| b) Long distance between farm and markets | 9.1 | 1.47 | 2 |
| c) A market that discriminates small-scale mango farmers | 9.0 | 6.56 | 3 |
| d) High cost of getting fruits to the market | 9.0 | 1.51 | 4 |
| e) Poor road infrastructure between the farms and lucrative marketing centres | 8.9 | 1.97 | 5 |
| f) No voice or control in lucrative markets | 8.9 | 1.31 | 6 |
| g) Inability to maximize opportunities that the value chain presents | 8.8 | 6.54 | 7 |
| h) Products are of poorer quality compared to those for competitors | 8.7 | 1.58 | 8 |
| i) Mainly produce varieties that are not so much in demand | 8.4 | 1.74 | 9 |
| j) Lack of knowledge of the value chain, i.e. from farm gate to consumers | 8.3 | 1.49 | 10 |
| k) Lack of marketing facilities | 8.2 | 1.51 | 11 |
| l) Lack of markets | 7.6 | 1.84 | 12 |

**Source: Author's Calculations Using SPSS (09/2013)**



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### 5.1.2 Perceived Causes to Challenges Smallholder Mango Farmers Faced

Smallholder mango farmers in Vhembe district Municipality suggested various causes to the challenges they faced. The challenges were categorized into the following sub-themes: production, processing and marketing. Farmers' low levels of education seemed to be the dominating factor, as it was ranked first. Lack of access to funding was ranked second, and respondents were of the view that access to funding to grow or expand farming capacity must be provided. Knowledge and skills-related solutions were regarded central to the challenges that smallholder mango farmers faced. Theft of produce was ranked fifth as a notable cause to their challenges.

In terms of processing, lack of processing infrastructure ranked first as a cause of challenges they faced regarding processing, while lack of processing skills was ranked second as a main hindrance from processing or adding value to their produce.

With regards to marketing, respondents reported lack of training in marketing as a major cause to marketing challenges they faced (ranked 1$^{st}$). "Most farmers do not take farming as a business" was ranked second as a cause to market challenges smallholder mango farmers faced. Ranked third were agricultural policies, the smallholder mango farmers reported that Agricultural policies make it difficult for them to play a more active role in the agricultural value chain.

Table 5.3 shows the mean scores and rank orders for the 10 causes suggested as causes to challenges that smallholder mango farmers faced in production, processing and marketing. With regard to production, the following perceptions were ranked high: "most farmers have low levels of education"; "lack of access to funding to grow or expand farming capacity"; and "lack of relevant training in mango farming as a business". The least ranked mean score in this category was "theft of produce". In the processing category the first ranked cause was "lack of processing infrastructure", followed by "lack of processing skills". The causes relating to marketing were ranked in the following order of importance: "lack of training in marketing", "most farmers do not take farming as a business" and "Agricultural policies make it difficult for smallholder mango farmers to play a more active role".



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**Table 5.3: Ranked means for perceived causes to the challenges that the smallholder mango farmers faced**

| Perceptions | Mean | Std. Deviation | Ranking |
|---|---|---|---|
| **Production** | | | |
| a) Most farmers have low levels of education | 8.7 | 1.43 | 1 |
| b) Lack of access to funding to grow or expand farming capacity | 8.7 | 1.07 | 2 |
| c) Lack of relevant training in mango farming as a business | 8.6 | 1.59 | 3 |
| d) Vandalisation of farming implements and infrastructure | 8.1 | 2.09 | 4 |
| e) Theft of produce | 7.3 | 1.92 | 5 |
| **Marketing** | | | |
| a) Lack of training in marketing | 8.8 | 1.15 | 1 |
| b) Most producers do not take farming as a business | 8.2 | 1.67 | 2 |
| c) Agricultural policies make it difficult for smallholder mango farmers to play a more active role | 7.3 | 2.01 | 3 |
| **Processing** | | | |
| a) Lack of processing infrastructure | 9.7 | .66 | 1 |
| b) Lack of processing skills | 9.7 | .65 | 2 |

**Source: Author's Calculations Using SPSS (11/2013)**



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## 5.2 Discussion

### 5.2.1 Production Challenges

#### 5.2.1.1 Lack of Farming Infrastructure

Mango trees like other subtropical fruits are drought tolerant but require good rainfall distribution for flowering and fruit set. In order to meet these requirements, an annual rainfall of 250-1500 mm is needed (Department of Agriculture, 2004). However, in Vhembe District where this study was conducted, an annual rainfall of less than 1000 mm is received. The distribution and timing of its availability, whether it is flowering or fruiting time is what is important. Therefore, there is a need for additional water supplies. This concurs with the findings of this study where majority of the respondents perceived lack of irrigation systems as a major production challenge. Furthermore, these findings are not surprising considering that water supply is perceived as a major problem in smallholder farming system in Vhembe District (Tshikhudo, 2005).

In smallholder farming, infrastructure is often lacking. In this study, the respondents reported that they lacked farming-related infrastructure. According to Pote (2008), agricultural related assets availability influence production and marketing decisions among smallholder farmers. This line of argument was substantiated by Jari and Fraser (2009) when they allude that smallholder farmers with relevant infrastructure are more likely to produce and market their produce than those without. Taking this into account, it can be concluded that lack of farming infrastructure considerably influence the extent to which smallholder mango farmers participated in the market.

#### 5.2.1.2 Lack of Technical Skills

Smallholder mango farmers in Vhembe District ranked 3rd "lack of production technical knowledge" as a production challenge they faced. They singled out pruning, pest control, fertilization and post-harvest technology as critical skills they lacked. The respondents indicated that they were expecting Extension officers to give them advice on these areas but they are not available. Respondents blamed the lack of reliable extension services on the poor quality of their produce. Ngemntu (2010) confirms this finding by indicating that most of smallholder farmers often have little or no formal education and are generally unable to make rational decisions in their farming activities, which results in limiting their production.



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The World Bank (2008) substantiated these findings by indicating that the majority of smallholder farmers in developing countries are often illiterate, with poor technological skills, which can be a serious obstacle in assessing useful formal institutions that disseminate technological knowledge. Mudau, Geyser, Nesamvuni and Belemu (2009) reported similar challenges about extension officers in their study that they lack technical knowledge, are inefficient and fail to meet farmers' needs.

### 5.2.1.3 Lack of Financial Support

Financing of agricultural inputs and labour wages requires capital, which often is not readily available to the smallholder mango farmers. Dzadze *et al.* (2012) in their study of factors determining access to formal credit by smallholder farmers in Ghana, indicated that credit is an important resource that allows farmers to expand their operations and adopt new technologies. Their findings are consistent with the findings of the current study where respondents ranked "lack of financial support" as their fourth challenge. Respondents blamed their inability to buy production inputs such as fertilizers, insecticides and pesticides to their lack of finance. The respondents were all in agreement that their produce were of poor quality due to high production costs.

Farmers in this study highlighted lack of information about availability of financial assistance, collateral and Bank accounts as some of the factors hindering them from getting financial assistance from financial institutions. In support of this argument the World Bank (2008), reports that access to formal financial services in smallholder farmers in rural areas is lacking despite the general growth in financial service delivery worldwide. According to the same authors, in India a survey of 6000 smallholder farmers' households was conducted and 87 % of the respondents had no access to formal credit and 71 % had no access to a savings account in a formal financial institution.

All respondents did not have Title Deeds and financial institutions prefer Title Deeds as collateral. Information about financial assistance is not disseminated efficiently due to extension service inefficiency. Furthermore, respondents indicated that inadequate labour in their farms resulted from lack of finance. This supports the argument of De Soto (2001) about dead capital which smallholder farmers possess. The author argues that smallholder farmers have assets which cannot assist them because their lack of registration makes them valueless. Ntsebeza (2007) substantiated this argument by indicating that smallholder



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farmers operate their farms using mainly family labour and employ capital and machinery that is not expensive and can afford or hire in rentals.

### 5.2.1.4 Post-harvest Losses

Postharvest loss was identified as one of the major challenges smallholder mango farmers faced in the study. The respondents complained that more than half (60 %) of their mangoes were lost due to rotting. Respondents blamed postharvest losses on pests, diseases, excess fruits in the market and lack of postharvest storage facilities. Gitonga *et al.* (2010) concur with these findings by indicating that in the study conducted in Kenya, on enhancing small scale farmers' income in mango production through agro-processing and improved access to markets, most smallholder mango farmers' experienced high wastage during postharvest due to surplus fruits in the market and production areas and perishability of the produce.

Gathambiri *et al.* (2006) highlighted the same challenge in their study, indicating that 40–45 % of mangoes were lost during postharvest handling due to mechanical damage, pests, diseases, excessive fruits in the market and immature harvesting. Therefore, training smallholder mango farmers on pests, diseases identification and postharvest handling could be a possible solution that might reduce postharvest losses and increase market participation.

### 5.2.1.5 Unavailability of Commercial Cultivars

In addition to the preceding challenges, smallholder mango farmers identified unavailability of commercial cultivars such as Tommy Atkins, Kent, Keitt, Heidi and Sensation as an important challenge they faced. Eighty percent of the respondents indicated that 70 % of mango trees in their farms were not of commercial characters due to lack of commercial cultivars. Respondents indicated that the few commercial cultivars in their farms were obtained from neighbours and own farms. All respondents indicated that they were ready to replace the non-commercial cultivars with commercial cultivars if provided with them because of lack of market for them as compared to commercial cultivars.

Similar challenges were experienced by smallholder mango farmers in Kenya (Ministry of Agriculture, MOA, 2006). The latter author reveals that smallholder mango farmers in Kenya had planting materials challenges and the majority of them sourced their planting materials from neighbours, own farm and mango nurseries.



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### 5.2.2 Marketing

Lack of shareholding stake in the lucrative markets was ranked as the first marketing challenge respondents faced. They indicated that their produce were not treated equally with those of commercial farmers in the market because of lack of representativity. Respondents reported that at the market, marketing agents are overlooking their produce for the ones of commercial farmers. According to the respondents, the agents most often would contact them after a while indicating that their produce got spoiled or sold at very low price due to bad quality.

This concurs with the results of a study in Kenya in which Horticultural Crop Development Authority (HCDA, 2006) observed that smallholder mango farmers largely depend on brokers, export agents or local traders for market information. The authors further indicated that this kind of arrangement is generally unstable and offers them low and unpredictable prices.

The distance between farms and market places is another challenge smallholder mango farmers in this study faced. All respondents in this study were located in rural areas and all market places in town. It was observed in the current study that the furthest farmer is 500 km to the nearest functional Fresh produce market. Most of the respondents (90 %) complained about lack of transport since they did not have their own transport. They indicated that lack of own transport compelled them to hire transport making it too expensive to take their produce to the market.

According to the respondents, the cost of transport depletes all the profit, hence, their decision to use other marketing alternatives such as farm gate and spot markets. Makhura (2001) supports this finding by indicating that transport problems, searching for markets and education tend to influence smallholder farmers market participation. Heinemann (2002) substantiates this argument by stating that lack of access to profitable markets is the main reason why even those farmers who can produce surplus remain trapped in the poverty circle.

Poor road infrastructure between the farms and markets was ranked as the fourth marketing challenge they faced. Smallholder mango farmers indicated that roads to their farms were not maintained by the government. They further reported that the bad state of roads made



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transport operators reluctant to transport mangoes from their farms to the market. The few transport operators who were willing to assist charged higher prices than the normal rate.

This finding confirms what Kherallah and Kirsten (2002) also found. They indicated that smallholder farmers in rural areas are often geographically dispersed, with poor roads and communication resulting in insufficient volumes of business to can encourage any private sector service provision. A possible solution might be for smallholder mango farmers to form collective marketing associations to increase their buying and selling power in the market place. The government can also improve the participation of farmers to markets by constructing and maintaining their roads assist in promotion of programme linked to value addition through provision of processing facilities for enhancing the quality of marketable produce.

Smallholder mango farmers in the current study complained about the impact of quality on the marketability of their mangoes. The respondents indicated that lack of refrigerated trucks for transporting their mangoes to the fresh produce market affected the quality of their mangoes because they are highly perishable. This short coming resulted in their produce getting spoiled before those of commercial farmers. Furthermore they mentioned diseases and bruises due to bad roads and improper harvesting methods as the other factors contributing to the low quality of their produce. Availability of information on fruit grades and standards, and improvement in storage and transportation technology might be a solution to this challenge.

Lack of commercial cultivars was ranked ninth as a marketing challenge respondents faced. They complained that the market of ripe mangoes was more profitable at approximately R 5000/ton than that of green mangoes (approx. R 1000/ton). But only commercial cultivars were needed in the ripe mangoes' market. Unfortunately for smallholder mango farmers in this study their farms were 70 % non-commercial fibrous cultivars. Therefore, they were forced to sell their produce at the green mango market, where there is lot of exploitation.

### 5.2.3 Processing

Processing or value addition is the process whereby the shelf-life of an agricultural produce is extended or improved. In the case of mangos this can be through drying, waxing, juice production, freezing, fermentation and others. Processing of mangos into products of high value would be a way of mitigating against postharvest losses and diversify utilization and



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marketing. The common challenges smallholder mango farmers faced regarding processing were lack of processing facilities and technical skills. Dorward *et al.* (2005) report that smallholder farmers have limited ability to add value to their produce due to lack of processing facilities.

The authors further indicated that this constraints farmers supply response to any incentives in both production and marketing. All the respondents in this study complained about unavailability of processing facilities in their farms and Vhembe District at large. The respondents indicated that availability of processing facilities would save them from exploitation they experienced from green and ripe mango processors. Finance was identified by all the respondents as the main obstacle to processing their produce.

In addition to the preceding challenge of lack of processing facilities, respondents in this study complained about inadequate technical knowledge and skills. This finding is confirmed with the results of a study in Kenya in which Gitonga *et al.* (2010) reported that smallholder mango farmers lack processing equipment, skills and seasonal variations. The authors further indicate that capacity building on processing procedures and establishment of a processing unit as a group would enable them to acquire proper processing equipment for production of quality products for the markets. As a group they would have a higher bargaining power for their products.

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### 5.3 Conclusions

Despite the considerable contribution of smallholder mango farming sector to rural development, they complained about the multiple challenges they faced in production, processing and marketing. Among others, smallholder mango farmers complained about production challenges such as lack of on-farm infrastructure, technical skills, financial support, post-harvest losses due to rotting and unavailability of commercial cultivars. In processing, lack of facilities and inadequate technical knowledge and skills were identified amongst the main challenges. In relation to marketing, they identified long distance between farm and market, poor road infrastructure between farms and markets, lack of markets, poor quality of products compared to those of competitors, and lack of control or voice in lucrative markets as problems they faced.

In order to address the challenges that the smallholder mango farmers faced, they suggested the following as perceived causes which if addressed could lead to solutions to



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their challenges: in production, farmers' low levels of education and lack of training in farming as a business, were identified as some of the perceived causes; lack of processing skills was identified as a cause of challenges in processing, while lack of training in marketing and unfavourable agricultural policies perceived as causes of marketing challenges.

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# CHAPTER 6: COMPARISON OF PHYSICO-CHEMICAL CHARACTERISTICS OF MANGOES CULTIVATED IN LARGE-SCALE COMMERCIAL AND SMALLHOLDER FARMING SYSTEMS IN VHEMBE DISTRICT

## 6.1 Results

Figure 6.1 shows the average weight of fresh fruits per cultivar and farming system. The Kent (smallholder farms) fruits were heavier (684 ± 20 g) than those from the large-scale commercial sector ($P < 0.05$). A similar pattern was observed for the Keitt cultivar, with the fruits from the smallholder mango farming sector being heavier (517 ± 15 g) than those from large-scale commercial farms ($P < 0.05$). There were no statistically significant differences between the two farming systems in the average weights of the fruits of the other cultivars. However, 60 % spoilage rate was observed in mangos from smallholder farmers when stored at room temperature (25 °C) for a period of 10 days. The Sugar mango (non-commercial cultivar) had the lowest average weight, estimated to be 235 ± 18 g.).

Table 6.1 shows the pH, texture, TSS, TA and TSS:TA ratios for Sensation, Heidi, Kent, Keitt and Sugar mango (control) cultivars. Significant inter-farming system differences in acidity were observed for the mango cultivars ($P < 0.05$). In both farming systems, Keitt and Kent had the highest acidity, 0.34 % and 0.3 %, respectively. The lowest acidity of 0.17 % was found in Sensation (commercial) and also 0.18 % for the Sugar mango variety.

In both farming systems, the TSS contents of the Kent (19.17) control (Sugar mango) (18.97) varieties were the highest compared to the other cultivars. The lowest TSS values were observed for Heidi in the large-scale commercial (15.67) and smallholder (15.84) farming systems and were not statistically significantly different. Table 6.2 shows some important organoleptic characteristics for the cultivars, viz. fruit shape, skin colour, pulp colour and fibre availability.



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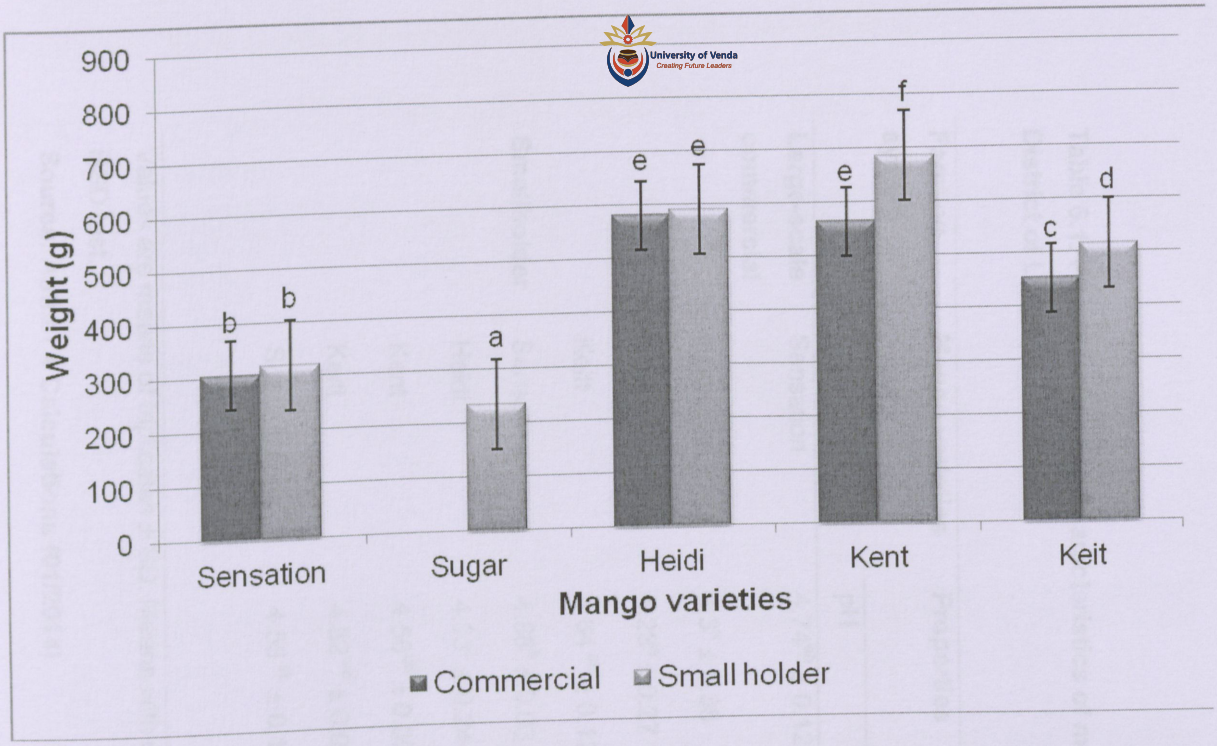


**Figure 6.1** Average fresh weights of fruits for Sensation, Sugar (Control), Heidi, Kent and Keitt cultivars grown on commercial and smallholder farming systems studied at maturity stage

**Key:** Vertical bars represent standard errors (SE)

Different letters for the error bars indicate statistically significant differences (LSD, $P < 0.05$)



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**Table 6.1: Physico-chemical characteristics of mangos from large-scale commercial and smallholder farming systems in Vhembe District of Limpopo Province**

| Farming system | Mango varieties | Properties | | | | |
|---|---|---|---|---|---|---|
| | | pH | Texture (N) | TSS (°Brix) | TA | TSS:TA |
| Large-scale commercial | Sensation | $4.74^{ab} \pm 0.12$ | $2.11^{a} \pm 0.53$ | $17.17^{d} \pm 0.29$ | $0.17^{a} \pm 0.03$ | 101.0 |
| | Heidi | $4.3^{a} \pm 0.38$ | $2.21^{a} \pm 0.79$ | $15.67^{a} \pm 0.58$ | $0.25^{bc} \pm 0.02$ | 62.7 |
| | Kent | $4.23^{a} \pm 0.27$ | $2.21^{a} \pm 0.85$ | $18.97^{e} \pm 0.23$ | $0.29^{cd} \pm 0.01$ | 65.4 |
| | Keitt | $4.64^{ab} \pm 0.12$ | $2.31^{a} \pm 0.33$ | $16.65^{bc} \pm 0.3$ | $0.34^{d} \pm 0.02$ | 49.0 |
| Smallholder | Sensation | $4.88^{b} \pm 0.03$ | $1.8^{a} \pm 0.46$ | $16.99^{cd} \pm 0.01$ | $0.19^{ab} \pm 0.03$ | 89.4 |
| | Heidi | $4.93^{b} \pm 0.24$ | $2.28^{a} \pm 0.76$ | $15.84^{ab} \pm 0.3$ | $0.26^{c} \pm 0.02$ | 60.9 |
| | Kent | $4.56^{ab} \pm 0.09$ | $2.28^{a} \pm 0.92$ | $19.17^{e} \pm 0.15$ | $0.3^{cd} \pm 0.01$ | 63.9 |
| | Keitt | $4.62^{ab} \pm 0.09$ | $1.84^{a} \pm 0.32$ | $16.20^{bc} \pm 0.2$ | $0.34^{d} \pm 0.01$ | 47.7 |
| | Sugar mango | $4.55^{ab} \pm 0.1$ | $2.4^{a} \pm 0.45$ | $21.57^{f} \pm 0.4$ | $0.18^{a} \pm 0.03$ | 119.8 |

Values are means of triplicates ± SD. Means with different superscripts within the same column are significantly different ($p < 0.05$) using Tukey HSD test.

**Source: Author's Calculations (01/2014)**

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**Table 6.2: Organoleptic characteristics of mangos at maturity stage of each cultivar**

| Farming system | Mango cultivar | Fruit shape | Skin color | Pulp color | Fiber presence |
|---|---|---|---|---|---|
| Commercial | Sensation | Oval | Purple | Orange | Low |
| | Heidi | Round | Purple, red and yellow, | Orange | Low |
| | Kent | Ovoid-oblique | Green-yellowish | Yellow-orange | Medium |
| | Keitt | Oval | Green with slight dark red blush | Yellow/orange | Low |
| Smallholder | Sensation | Oval | Purple | Orange | Low |
| | Heidi | Round | Purple, red and yellow, | Orange | Low |
| | Kent | Ovoid-oblique | Green-yellowish | Yellow-orange | Medium |
| | Keitt | Oval | Green with slight dark red blush | Yellow/orange | Low |
| | Sugar Mango | Oval | yellow | Yellow | High |

**Source: Research Data (01/2014)**



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Fruit quality is measured in terms of the TSS and TSS:TA ratio. Quality fruits have a higher TSS:TA ratio than those of lower quality. In the current study, the highest TSS:TA ratios were observed for cultivars from the large-scale commercial farming sector. However, the ratios were higher than those that Mussane (2010) obtained in Mozambique. This difference might be due to poor farm management practices on smallholder mango farms. For example, fruit trees are never fertilized, irrigated and pruned (Tshikhudo, 2005). In addition, pest, disease and weed control are not commonly practiced on smallholder mango farms. According to El-Razek, Abd-Allah and Saleh (2013), increased application of NPK fertilizer results in higher TSS and reduced total fruit acidity. Therefore, it can be concluded that fruits from large-scale commercial farming sector, where fertilizers are applied to mango trees, are of good quality than those from smallholder farming sector.

The texture of a fruit is directly related to its maturity. Firmness of a fruit decreases as it ripens. Jha, Jaiswal, Narsaiah, Kaur, Singh and Kumar (2013) attribute this to structural changes of the pectin polymers in the cell wall as ripening advances. The authors indicate that a decrease in pectin (both water and alkaline soluble) accompanies the softening in fruits. This decline in alkaline soluble pectin was found to be correlated with the loss of the fruit's firmness and also with the increase in polygalacturonase activity during fruit ripening.

Consumers often place considerable emphasis on fruit texture when buying. This is due to the fact that most consumers associate soft texture of fruit with ripeness. Therefore, they prefer to touch and judge the softness of the fruit before buying. In the current study, no significant differences were observed in the texture or firmness of all the cultivars from the two mango farming systems.

With respect to organoleptic properties, all the cultivars used in the current study with the exception of Sugar mango had low fiber content. This conforms to the standard organoleptic characteristics of these cultivars as stipulated in the Department of Agriculture and Land Affairs Yearbook (2007). This is in line with the standard features preferred in the national and export market of fruit color, appearance, flavor, size, health and safety (Hassan, Musa and Yusof, 2010). Therefore, there is a need to assist smallholder mango farmers so that they improve their farm management in order to ensure that their produce matches that produced on large-scale commercial farms. By so doing, their participation in lucrative commercial markets might be improved.

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## 6.3 CONCLUSIONS

This study revealed that various physico-chemical fruit parameters help specify the quality of mango fruits. It was observed that mangoes produced on smallholder farms in Vhembe District met the standard parameters considered when determining marketable quality. No significant differences were observed in almost all the parameters considered in this study. However, the size of mangoes from large-scale commercial farms was smaller compared to those from the smallholder farming sector.

Mangoes from the smallholder farms had a 60 % spoilage rate when stored at room temperature for 10 days. This was attributed to lack of spraying and disease control programs in the smallholder mango farming sector. Therefore, cultivation of mangoes in the smallholder farms offers promising possibilities of producing fresh fruits of high marketable quality. This is likely to be the case given the fact that they are already producing good fruits.

There is a need to build the capacity of smallholder farmers to effectively control pests and diseases since this can further improve the quality of mangoes and help increase market access and subsequently increase revenue. Furthermore, smallholder farmers need to acquire skills in use of post-harvest technology for them to be able to reduce the high losses currently experienced in this period.


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# CHAPTER 7: FACTORS INFLUENCING CONSUMER PREFERENCE OF FRESH AND PROCESSED MANGOES IN VHEMBE DISTRICT: A SHORT NOTE

## 7.1 Results

### 7.1.1 Participants

Two hundred and sixty-one (261) mango consumers participated in this survey. The oldest respondent was 70 years of age while the youngest one was 18 years old. Half of the respondents were 21-29 years old followed by those aged 15-20 (20 %). Slightly less than a tenth (9 %) of the respondents were 40–59 years old. Approximately, 36 % of the respondents were males. Fifty-eight percent of the respondents had attained tertiary education, while 39 % had secondary education.

### 7.1.2 Consumer Preference and Sources of Mangoes

More than two thirds of the respondents (72 %) indicated that they liked fresh mangoes. With respect to buying fresh mangoes from shops and markets, more than half of the respondents (54 %) reported that they did not buy any. Thirty six percent of those who bought mangoes in shops revealed that they never planned to buy mangoes prior to entering shops or markets but found themselves compelled to do so when they saw them on display.

A third of the respondents (33 %) indicated that they preplanned to buy fresh mangoes. Less than one-fifth (16 %) said they preplanned to buy processed mango products before entering shops but then bought fresh mangoes because they were attracted by the way they looked on display at the market. An almost similar proportion of the respondents (15 %) reported that they preplanned to buy other fruits but decided to buy mangoes after seeing the latter on display.

With respect to price of mangoes in relation to other fruits, 73 % of the respondents indicated that the price of fresh mangoes was more reasonable. Less than a third of the respondents (27 %) believed that the price was too high compared to the other fresh fruits. Seventy-five percent of the respondents said they had bought processed mangoes in the past month, with 14 % having done so only in the past year. Slightly more than a tenth of the respondents (11 %) could not recall when they last bought processed mangoes.

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Eighty-two percent of the respondents preferred fresh mangoes. For 46 % of the respondents, the good taste of fresh mangoes was the main reason why they preferred fresh mangoes over the processed ones. Eleven percent of the respondents indicated that the lower prices of fresh mangoes compared to the processed products made them buy the former.

### 7.1.3 Influence of Age on Mango Preference

As shown in Figure 7.1, age group had an influence on consumer preference for mangoes. About 73 % of youth preferred fresh mangoes, made up of 53 % of those aged 21-29 and 20 % being 18-20 years old. It was also revealed that the 21-29 years old respondents preferred processed mangoes more than those in other age groups. Slightly less than a quarter (24 %) of the 30-39 years old respondents liked processed mangoes.

### 7.1.4 Effect of Age on Frequency of Consumption of Mangoes

As shown in Table 7.1, more than 58 % of the respondents who indicated that they seldom consumed mangoes and were between 21-29 years old. In the other age groups no such high percentages were reported. Furthermore the results revealed that most respondents belonged to the categories of heavy consumers (weekly consumers) and very heavy consumers (daily consumers).


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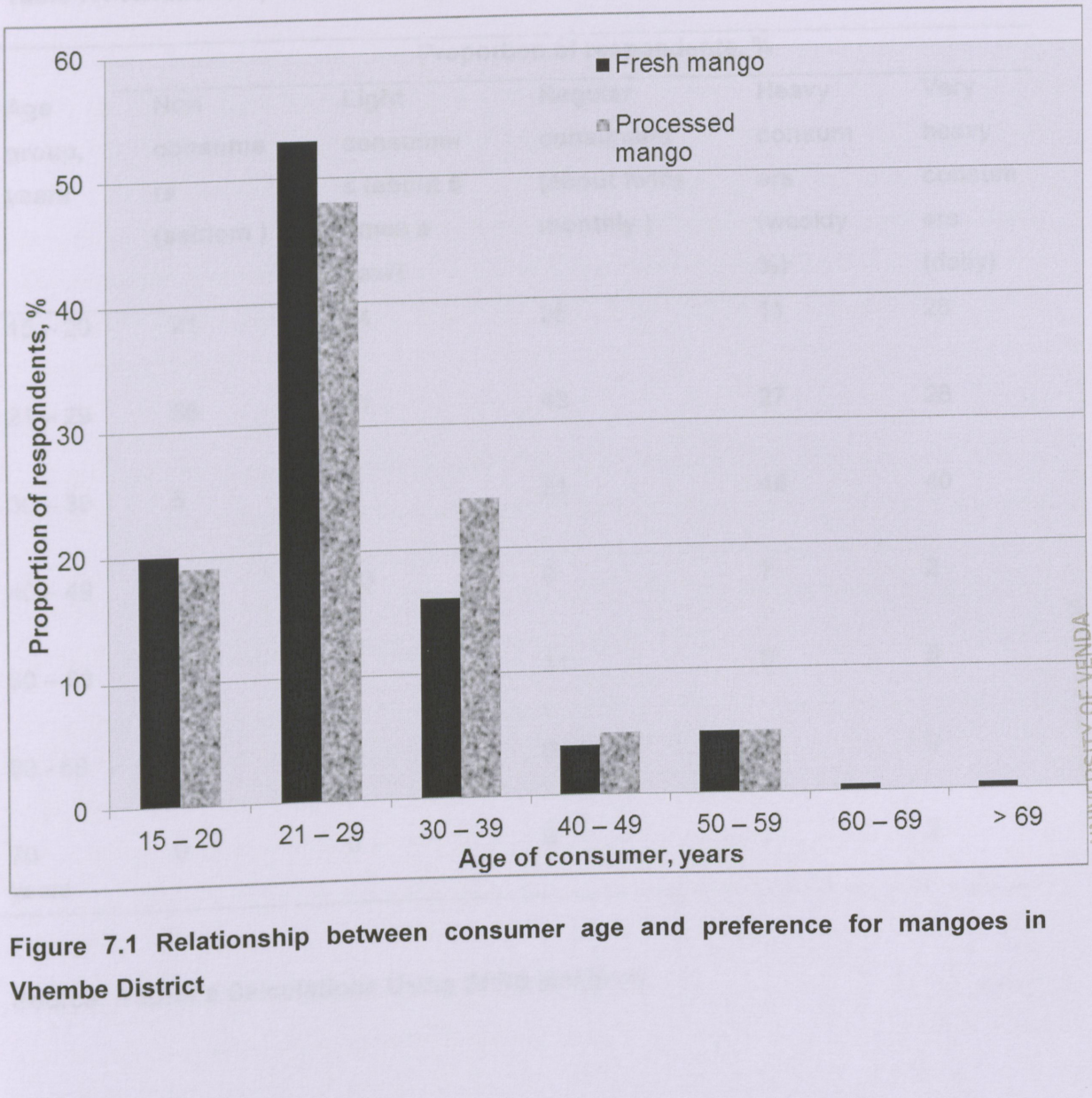


**Figure 7.1 Relationship between consumer age and preference for mangoes in Vhembe District**

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**Table 7.1 Relationship between frequency of consumption of mangoes and age**

| Age group, years | Proportion of respondents, % | | | | |
|---|---|---|---|---|---|
| | Non consumers (seldom ) | Light consumers (about 5 times a year) | Regular consumers (about twice monthly ) | Heavy consumers (weekly %) | Very heavy consumers (daily) |
| 15 – 20 | 21 | 14 | 25 | 11 | 26 |
| 21 – 29 | 58 | 71 | 43 | 27 | 28 |
| 30 – 39 | 5 | 5 | 21 | 48 | 40 |
| 40 – 49 | 11 | 10 | 0 | 7 | 2 |
| 50 – 59 | 5 | 0 | 11 | 5 | 5 |
| 60 - 69 | 0 | 0 | 0 | 1 | 0 |
| 70 years | 0 | 0 | 0 | 1 | 0 |

**Source: Author's Calculations Using SPSS (01/2014)**

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## 7.2 Discussion

Consumers' preferences of fruits result from complex interactions among socio-demographic, psychosocial and environmental factors (Kamphuis *et al.* 2006). This is partly why in this study an attempt was made to investigate whether demographic characteristics of consumers such as age and level of education influenced their preferences of mango cultivars and products. Several studies have also underscored that familiarity with a product, past behaviour and experience, beliefs and attitudes towards a healthy diet as well as the social environment were strongly associated with intake of fruits (Steptoe *et al.* 2004; Kvaavik *et al.* 2005).

The mango consumers who participated in this survey were predominantly women (64 %). This concurs with a study in Netherlands in which Boersma (2006) observed that women constituted more than half (58 %) of the respondents in his survey of randomly sampled mango consumers. The fact that in general, women regard healthy eating a priority, makes it not surprising that these were the outcomes of the two studies because mangoes are classified amongst highly nutritious fruits (Berardini *et al.* 2005).

In this study, more than two thirds of the respondents (88 %) were less than 40 years old. This concurs with the findings of Sabbe *et al.* (2009), who reported that 47 % of the consumers they interviewed were less than 40 years old. The South African population is made up of those predominantly less than 30 years old (StatsSA, 2013). Thus, it is not surprising that the results of the current study seemed to reflect this reality of the country's population.

In relation to education, it was observed that most of the respondents attained secondary and tertiary education. It is eminent, therefore that the more literate people are, the more conscious they become of health eating, and therefore more prone they are to be the biggest consumers of mangoes as the fruit is amongst the highly nutritious. Similar findings were reported in other studies in Belgium and Kenya (Boersma, 2006; Sabbe *et al.* 2009). According to Mitchel (2004), people with higher education eat more fruits. Centeno (2005) substantiated this observation, highlighting that among men, education is positively associated with fruit consumption as opposed to women where age and education are principal determinants of preferences.



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Seventy-two percent of the respondents in this survey preferred fresh to processed mangoes. They indicated that the fresh taste of fresh mangoes attracted them. High nutrient density in fresh mangoes was cited as the other reason for the preference of fresh mangoes. This is in line with the findings of a study in Kenya. In the latter study, Boersma (2006) observes that consumers prefer fresh mangoes as opposed to processed products.

Although consumers mainly preferred fresh mangoes, more than half of the respondents indicated that they did not buy fresh mangoes in the previous mango season. The respondents reported that because they had mango trees on their homesteads they found no reason for buying fresh fruits from shops or supermarkets. They only bought the mangoes from shops and market during the off season. Furthermore, most of the respondents reported that because they are used to getting mangoes from their backyards, it becomes difficult for them to have prior plans for buying mangoes while going to supermarkets and markets like what they do with other fruits not available at their backyards. Hence, the purchase of mangoes was based mainly on impulsive actions.

With respect to the price of mango, almost three quarters agreed that fresh mangoes were cheaper than other fruits. Since most households in Vhembe District grew mangoes, and considering the laws of supply and demand, this was expected. Boersma (2006) established a similar pattern in Nairobi, Coastal, Eastern and Northern part of Kenya. Fresh mangoes are cheaper than other fruits due to the fact that there is an over-supply thereof (supply exceeding demand). Hence, there is a need for processing to avoid the high loss due to rotting.

All the respondents knew available processed mango products, which they bought from shops. However, the processed mango products were reported to be more expensive than the fresh fruit. Processing provides long life span of the product (mangoes) and prevents loss of income. Therefore, processing will generate additional income as the smallholders will have products on sale for all seasons (no more seasonal incomes) so it is important in maintaining their livelihoods. These results highlight the existence of a market opportunity for fresh and processed mangos within Vhembe District.

Another issue investigated in this study was consumer preference of mango cultivars. The five varieties commonly grown in Vhembe District, namely Tommy Atkins, Kent, Keitt, Sensation and Sugar, formed the basis of the study. Consumers' level of education and familiarity with mango products influenced their preferences. Cheron and Hayashi (2001)



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also report that the level of familiarity with the product has a major impact on purchasing behaviour. Van Kleef, van Trijp and Luning (2005) justified that the number of product-related experiences, lead to the development of attitudes towards it and subsequent behavioural as well as the intention to purchase.

In this study, consumers who had attained secondary and tertiary education mainly preferred the commercial cultivars, namely Tommy Atkins, Kent, Keitt and Sensation. This was in sharp contrast with consumers with primary and no formal education who revealed that they did not have any specific mango cultivar they preferred most. However, all the respondents reported that the Sugar mango was most preferred because they were very familiar with it.

Consumers were categorized into seldom; light, regular, heavy and very heavy consumers. More than 78 % of the respondents were seldom consumers and less than 30 years old. Some of the respondents (interviewed University of Venda Students) indicated that fibres in mangoes irritate them when they are eating mangoes and also getting dirty hands when peeling the fruit deter them from eating mangoes.

Therefore, it can be concluded that the preceding reasons and the assumption that majority of youths are not health conscious when it comes to eating habits, might be the reason for moderate consumption of mangoes by youths in Vhembe District. Presumably, introduction of low fibre mango cultivars might result in increased consumption of mangos by the youth. Such a shift is likely to significantly broaden the mango market since youth constitute the majority in Vhembe District (VDM-LED Strategic Plan, 2007).

### 7.3 Conclusions

The findings of this study highlighted that demographic characteristics, such as age, education and gender, influence mango consumers' preferences. In this study respondents of age 30 years and below reported to be seldom mango consumers, while those above 30 years of age were found to be regular and heavy consumers. In relation to gender, women reported to be heavy consumers and this was attributed to their healthy eating habits since mangoes are classified amongst the highly nutritious fruits.

The respondents preferred fresh to processed mangoes. They cited the natural good taste, low price and high nutritional content as reasons for preferring fresh mangoes. The price of



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fresh mango was considered lower and inferior to those of other fresh fruits by respondents.

The current study confirmed that in Vhembe District, fresh mango and its products are popular in both youths and adults consumers, therefore it can be concluded that there is a good market for smallholder mango farming produces. Although, there is a good market potential, there is a need for producers to diversify and start planting commercial cultivars since consumers seem to prefer cultivars they do not have at their backyards. Despite being good consumers, respondents indicated that they prefer buying mangoes when they no longer have them at their backyards and this opens a market for value added mango products which can be available all seasons. Therefore, it can be concluded that there is a need for processing facilities so that smallholder mango farmers can process their fresh fruits into various mango products.



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# CHAPTER 8: SUMMARY, INTERVENTION MODEL, CONCLUSIONS AND RECOMMENDATIONS

This chapter provides the summary, intervention framework and conclusions of the study. It is subdivided into four sections. Section 8.1 summarizes the study, and the Intervention Model is presented in 8.2. Section 8.3 presents the conclusions of the study and makes recommendations for policy and further research.

## 8.1 Summary

The main objective of this study was to investigate the factors inhibiting smallholder mango farming in Vhembe District from participating in commercial markets. In particular the study attempts to examine or identify the constraints smallholder mango farmers are encountering when accessing markets. Identification of such constraints might support efforts to create the appropriate environment for smallholder mango farmers for integration into the lucrative agricultural markets. This will further assist the government to reach its objective of removing dualism in the agricultural sector.

Smallholder mango farmers are generally poor and their contribution to the mainstream agricultural market is minimal due to low production and poor access to other options for obtaining a livelihood. However, this study found that, these farmers can survive economically when given opportunities to transform from subsistence to commercial operators. Participation of smallholder mango farmers in the market can result in strong multiplier effects. At the moment few smallholder mango farmers are participating in the market in Vhembe District. This is due to a number of constraints beyond their control.

In an effort to resolve this, the study was subdivided into four interlinked sub-studies focusing on the socio-economic characteristics and production systems of the smallholder farming sector; quantity and quality of their produce; support frameworks and policies in place and access to market constraints. The roles external stakeholders are playing were sought. The following are the key findings of these sub-studies.

Most households in the selected sample consisted of 4-6 members and mostly headed by men. Hence, participants were predominantly men (59 %). Over 60 % of the farmers have land size of less or equal to 2 Ha. The sector is dominated by old people of over 50 years. Literacy level is high in the sector with 98 % of participants had formal education. Dryland farming is the dominant type of farming practiced due to lack of resources. They are making



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minimal income from their farming activities, with 70 % of farmers earning less than R 10 000.00 in a mango season. All the farmers have no ownership of land but Permission to Occupy (PTO). Forty five percent of the farmers are members of the mango commodity association and their market participation is better than of non-members. The association is an affiliate of SAMGA and members are provided with market information and extension services.

In case of quality and quantity, the study findings established farmers have commercial and non-commercial mango cultivars on their farms. The dominant commercial cultivars were Tommy Atkins, Keitt, Kent, Heidi and sensation. Sugar mango is the dominant non-commercial cultivar in the smallholder farming sector. Kent and Keitt mangoes from smallholder mango farmers were heavier when compared with the ones from large-scale commercial farmers. This was attributed to application of multi-K by large-scale commercial farmers to reduce the size in order to meet the national and international markets specifications. There were no statistically significant inter-farming differences in the average weights of fruits of other cultivars.

Furthermore, the findings of the study established that the quality of the commercial mango cultivars from smallholder farmers were found to be meeting the standard parameters considered when determining marketable quality. The notable difference was in relation to shelf-life. Mangoes from the smallholder farms had a 60 % spoilage rate when stored at room temperature for a period of 10 days.

The study findings established that mango consumers in Vhembe District prefer fresh mangoes to processed mango products. The consumers agreed that the price of fresh mangoes is lower than of other fruits in the market due to abundance of them in the area. The results confirmed the existence of mango market in Vhembe District.

On policies and programmes supporting smallholder farmers the following were reviewed: National Agricultural Marketing Council (NAMC), Land Redistribution for Agricultural Development (LRAD), Agricultural Black Economic Empowerment (AgriBEE), Integrated Sustainable Rural development Programmes (ISRDP) and Comprehensive Agricultural Support Programme (CASP). The study findings established that although these programme had good intentions for championing smallholder farming system and rural development, their implementation is making them to fail to address their intended objectives. This is

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confirmed by the failure of smallholder farmers to move from subsistence to commercial farming.

In the case of constraints affecting their access to markets, smallholder mango farmers complained about the distance between them and the market in town. The distance deters them from taking their produce to the market due to lack of own transport. All respondents complained that the cost of taking their produce to the market is too high and it depletes all their profit. Hence, their decision to use less profitable alternative markets. Furthermore, the study results showed that geographical location has an influence on market participation whereby some farmers have some relative advantage to the others in terms of mode of transport and access to markets.

The study established that bad roads between farms and markets are reducing market participation by farmers. Smallholder farmers complained that because of bad roads the qualities of their produce are reduced before they reach the market. This makes their produce to be sold at lower prices compared to those of their competitors. The other factors contributing to their low participation farmers highlighted are the higher handling and storage costs they are being charged at the market due to the higher perishability of mangoes.

Furthermore, access to market information is extremely critical to the market participation decision. In this study farmers who are members of SAMGA are participating more in the market than non-members. SAMGA is organizing extension services and transferring market information to its members, while non-members are struggling to get the information through ineffective extension officers. The little information non-members are getting through the media is inadequate. The study established that affiliation to a farmers group like SAMGA, implies less constraints faced in search for trading partners and less costs involved in enforcing and monitoring the purchase and sales contracts.

The results of this study established that the availability of processing facilities in the vicinity of the farms can reduce postharvest loss drastically. This will assist the farmers to add value and prolong the shelf life of their produce and shields them from the urgency to sell. Once the urgency to sell is reduced, the seller becomes less responsive to market shocks.

The study results showed that older farmers participated more in the marketing of mangoes. This is probably due to the linkages and social networks built over time with trading partners as a result of repeated exchange activities that create some level of trust. The study


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established that mango market is sector biased towards large-scale commercial mango farmers tend to have an advantage. The discriminatory tendencies against smallholder mango farmers tend to discourage them from participating in the mainstream markets.

### 8.2 Intervention Framework and Cooperative Model

The results of this study found that there is evidence of constrains affecting the pattern or level of participation in the market by smallholder mango farmers. Therefore, there is a need to find mechanisms to reduce constraints smallholder mango farmers in Vhembe District are encountering when accessing mainstream markets. However, the approach should not only focus on reducing constraints during marketing but rather address the complete commodity supply chain. If a holistic approach is followed in order to reduce constraints in production, processing and marketing, this will bring a sustainable solution to the challenge at hand. In this study a holistic approach was used to examine the constraints smallholder mango farmers are faced with in production, processing and marketing.

This study is the first conducted in Vhembe District with the sole focus on smallholder mango farming sector. Makhura (2001) has similarly researched on how to overcome transaction costs barriers to market participation of smallholder farmers in the Northern Province. However, his investigation was not commodity specific. Tshikhudo (2005) also focused on lack of irrigation by subtropical fruits smallholder farmers in Vhembe District. Apart from focusing on several commodities, none of the previous researchers use his/her results to develop an intervention plan. This makes the current study in Vhembe District ground breaking and of very significant practical relevance in smallholder mango farming sector development planning. In the following sections, this issue is explored further within the broader context of the smallholder mango farming sector improvement or intervention framework that this study yielded.

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#### 8.2.1 Key Components of the Proposed Smallholder Mango Farming Sector Intervention Framework

The smallholder mango farming sector in Vhembe District presents significant opportunities to contribute to rural development. In order to realize this objective, the sector has to overcome the challenges inhibiting its full participation in commercial markets. In this study, various inter-related steps that guided how different stakeholders involved in smallholder mango farming sector could facilitate implementation of smallholder farming sector



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development were followed. This culminated in the formulation of the proposed smallholder mango farming sector development intervention framework as depicted in Table 8.1 (Appendix 8). The framework is anchored by production, processing and marketing components as its main pillars.

Production, processing and marketing are the main components of the mango commodity supply chain. Addressing the challenges the smallholder farming sector is faced with in these three components of the supply chain collectively will yield to a sustainable smallholder farming sector development. In previous studies these components were being addressed independently, hence, the little impact they made in improving the smallholder farming sector. The framework outlined the challenges, current status or literature review, intervention and responsible stakeholder for all the three components of the supply chain.

### 8.2.2 Proposed Model for implementing the smallholder mango farming sector Intervention Framework

The fact that this study facilitated the formulation of Vhembe District's smallholder mango farming sector development framework does not guarantee that it would be implemented. In order to ensure that implementation takes place; various activities need to be undertaken. Of critical importance is to encourage smallholder farmers to act collectively. By doing this they could overcome most of the significant challenges they faced as elaborated in the framework. This can be done by forming producer organizations, such as cooperatives.

Cooperatives are self-sustaining enterprises, using local resources, employing local masses and generating wealth for the good of its members and community as a whole (FAOSTAT, 2007). In the agricultural sector cooperatives are considered to be the most important organisations that pay attention and try to support rural development as well as agricultural development, especially through activities and services intended for farmers. They have mainly contributed to the agricultural sector by raising productivity, linking farmers to markets, reducing risk and vulnerability, facilitating agricultural entry and exit as well as increasing farm income (Simelane, 2011).

In Africa, Kenya is the success story of the appropriate application of the cooperative model in business development. The introduction of the cooperative model has turned the country's economy around so much that cooperatives are currently contributing 45 % to GDP. The government is committed to the cooperatives movement to a level wherein they



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now have a Ministry of Cooperatives in the country (South African National Apex Cooperative Magazine, 2011).

Regrettably in South Africa, cooperatives are not sustainable and as such, they do not achieve their objectives for job creation, poverty alleviation and growing rural economic base (Singh, 2010). There were 22 030 cooperatives in South Africa in 2009. The mortality rate of these cooperatives was at 88 %, which leaves a cooperative survival rate at 12 % (Singh, 2010). Agricultural cooperatives in South Africa contribute only 6.2 % to the country's GDP.

Failures of cooperatives in South African and Vhembe District in particular are attributed to among others, excessive government interference, infighting amongst cooperative members, poor financial management, lack of understanding of how a cooperative operates as a business, lack of financial support and worker cooperatives instead of user cooperatives (Makhavhu, 2013).

According to Makhavhu (2013), solution to failures of cooperatives in Vhembe District can be promotion of User-cooperatives approach as opposed to current Worker-cooperative approach the government is using. Promotion of vertical and horizontal integration of cooperatives can result in economies of scale which leads to marketing strength.

In Vhembe District, smallholder mango farming sector already has established mango commodity association and good communication network through usage of cell phones. In this proposed model, smallholder mango farmers will be mobilized to join commodity associations in their respective municipality wards. Members will pay a joining fee to show commitment. The joining fee will be converted into shares for members to become shareholders of the cooperative. This will instill a sense of ownership and business mentality to members.

The ward commodity association will be registered as a Primary cooperative. The Primary cooperative will nominate a board of directors and each village will have a representative. The ward based Primary cooperatives will form a Secondary cooperative at the local municipality level. The Secondary cooperative will have a board of directors constituted by representatives of each Primary cooperative. Finally, the four Secondary cooperatives will form a Tertiary cooperative at the district level (Fig. 8.1). The Tertiary cooperative will nominate a board of directors from members of Secondary cooperatives. The cooperative approach to be promoted is the User-cooperative approach. In this approach members use



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their cooperative for services only; it does not provide employment for them like in the case of Worker-cooperatives approach. Members become active members through supplying their mangoes. The more an individual farmer supplies, the more rewards or profit he gets. Members of the board of directors of all the cooperatives are not workers as workers will be recruited from non-members based on required skills needed.

The model will establish direct linkages between smallholder mango farmers and consumers. Primary cooperatives will establish collection points (warehouses) where farmers from villages will bring their produce and get paid. Mangoes from all the wards within a similar local municipality will be taken to the Secondary cooperative. The Secondary cooperatives through financing from public and private institutions will set-up processing facilities for both green and ripe mangoes. Stokvels will be encouraged among members in order to strengthen the cooperatives financial support. At the Secondary cooperative, mangoes will be sorted according to the preferential quality standards of local and national fresh mangoes market. Mangoes of low quality will be used for juice and dried products. Green mangoes of non-commercial cultivars will be processed into achar.

The Tertiary cooperative at the district level is responsible for sourcing markets for the produce. Mango and mango products from the secondary cooperatives will be collected at the district's warehouses and distributed to different market destinations. In order to strengthen and sustain their activities, the Secondary and Tertiary cooperatives should hire qualified technicians and managers.

After selling the products, the Tertiary cooperative receives sales revenues from the markets. This cooperative will transfer the sales revenues to the Secondary cooperatives and the latter to Primary cooperatives. Primary cooperative members to be paid the base mango price and the additional mango price difference as dividends. In addition to monetary benefits, the Secondary cooperatives also procure improved mango cultivars, fertilizers, chemicals and provide extension services to the primary cooperatives and member mango farmers (Fig. 8.1). The cooperatives will be responsible for implementing the framework and this will give the smallholder mango farmers an opportunity to speak with one voice. In this case it will be easier for them to benefit from resources different stakeholders provide.



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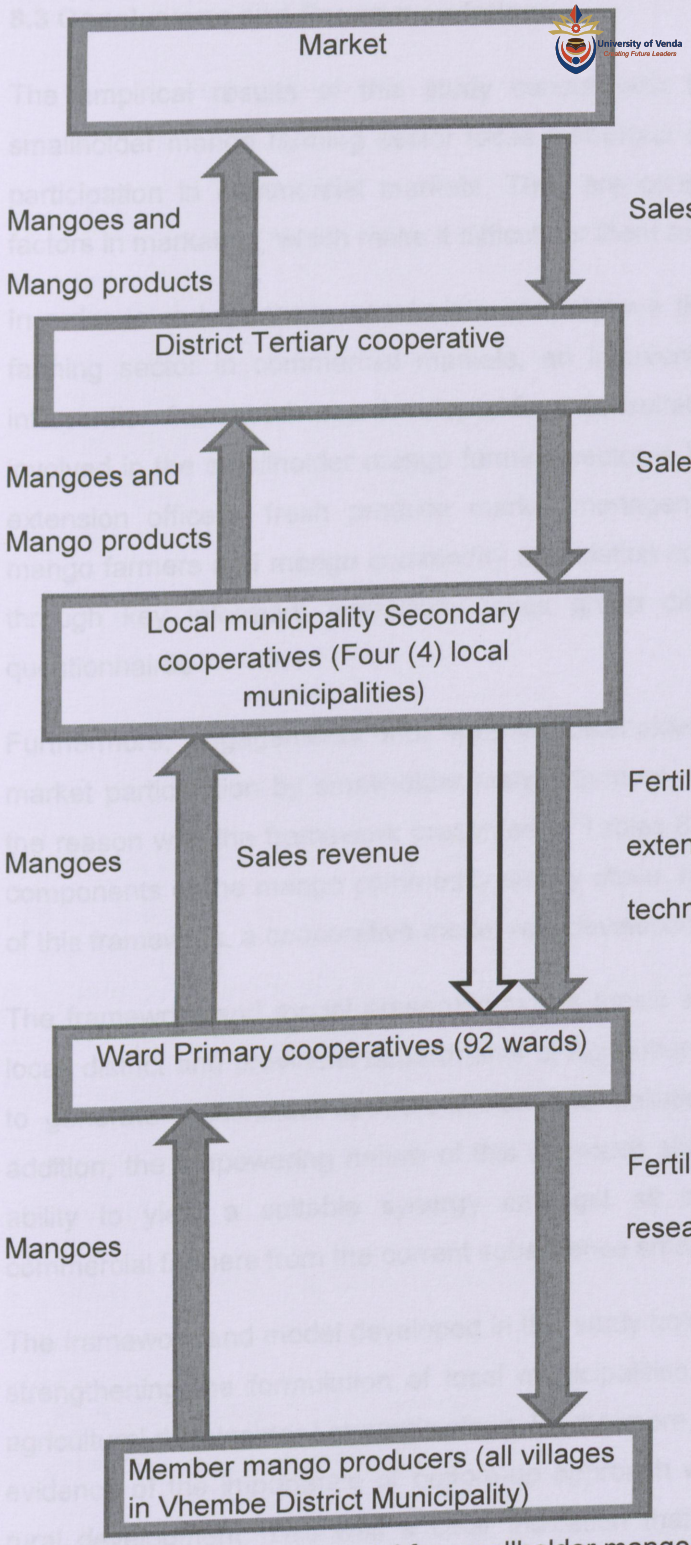


**Figure 8.1:** Cooperative model for smallholder mango farming sector development in Vhembe District



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## 8.3 Conclusions and Recommendations

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The empirical results of this study concur with the literature that identifies that the smallholder mango farming sector faces numerous challenges which militate against their participation in commercial markets. They are constrained by institutional and technical factors in marketing, which make it difficult for them to commercialize.

In order to reduce these constraints and improve the participation of smallholder mango farming sector in commercial markets, an intervention framework was formulated. This intervention framework was developed from consultations and contributions of stakeholders involved in the smallholder mango farming sector in Vhembe district such as, LED officers, extension officers, fresh produce market management, mango processors, smallholder mango farmers and mango commodity association committee members. This was obtained through key informant interviews, focus group discussions and face-to-face interview questionnaires

Furthermore, engagements with various stakeholders revealed that in order to improve market participation by smallholder mango farmers, a holistic approach is needed. This is the reason why the framework presented in Tables 8.1 was developed. It covers the major components of the mango commodity supply chain. In order to facilitate the implementation of this framework, a cooperative model was developed (Fig. 8.1)

The framework and model presented in this thesis are recommended for possible use by local, district and provincial departments of Agriculture, LED officers and other practitioners to generate smallholder farmers-owned and holistic development intervention plans. In addition, the empowering nature of this approach should be assessed in the context of its ability to yield a suitable synergy amongst all stakeholders and the emergence of commercial farmers from the current subsistence smallholder mango farmers.

The framework and model developed in this study hold considerable promise with respect to strengthening the formulation of local municipalities, district municipalities and provincial agricultural development strategic plans. Furthermore, the study demonstrated and provided evidence of the importance of bottom-up approach when addressing issues of farming or rural development. This was a clear indication that sustainable intervention begins with people themselves (their assets and capabilities) and seek to build on them not the opposite.



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### 8.3.1 Recommendations for Policy and Future Research

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In this study, a considerable number of research questions regarding smallholder mango farming sector and factors inhibiting its full participation in the commercial markets were answered (see Chapters 4, 5, 6 and 7). The recommendations that arose from this study could be broadly categorized into future research and policy issues.

1. There is a need for further research on creating and using traditional and new knowledge for improving the quality of mangoes going to the market

2. There is a need to introduce market specification contract farming with food processors. But further research on the suitable ways of linking the farmer groups to contractors is needed.

3. Intensification of existing farm production activities through increased use of inputs or top-working the existing non-commercial cultivars to commercial ones.

4. Collection points should be established next to farmers to assemble their produce for collective transportation to markets.

5. Provide institutions that can reduce production, processing and marketing constraints and provide inputs, technology, information, credit, insurance and support services.

6. There is a need for provision of processing facilities, at least one in each of the four local municipalities in the Vhembe District. The facilities should be for both green (achar) and ripe mangoes (juice and dried products) processing.

7. Provision of physical infrastructure, such as roads and electricity that connects farmers to markets.

8. There is a need to encourage collective action amongst farmers through formation and consolidation of farmers or commodity associations.

9. Promote value addition to farmers by creating awareness of its importance and provision of technical knowledge and skills.

10. The Local government needs to consider support policies and regulations that are necessary to stimulate growth among the smallholder farmers in order for them to withstand both local and national market competitors.



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## APPENDICES

### Appendix 1: Key Informant Interview Questionnaire

**TRANSACTION COSTS HINDERING MARKET PARTICIPATION BY SMALL HOLDER MANGO FARMERS IN VHEMBE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA**

**CENTRE FOR RURAL DEVELOPMENT AND POVERTY ALLEVIATION**

**UNIVERSITY OF VENDA**

**PRIVATE BAG X 5050**

**THOHOYANDOU**

**0950**

**TEL NO: 015 962 8000**

**Strictly Confidential**

This information is confidential and the name and address of the respondents will not be divulged for any purpose other than for this study.

**SEMI-STRUCTURED INTERVIEW GUIDE FOR KEY INFORMANT INTERVIEWS**

Name of the organization:.....

Position in the organization:.....

Tel No:.....

Cell No:.....

Respondent's remarks:

.....

.....

Interviewer's remarks:

.....

.....

Interviewer:..... Date completed:.....



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1. In your own opinion, what makes one qualify to be called a smallholder mango farmer?
2. In your own opinion, what does livelihood mean?
3. What do you think smallholder mango farming contributes to rural livelihoods or the local economy in Vhembe District?
4. What challenges do smallholder mango farmers face in production, processing and marketing?
5. What causes the challenges that the smallholder mango farmers face?
6. What must be done (and by whom) in order to solve the problems that smallholder mango farmers face?
7. As one of the stakeholders of smallholder mango farming, what do you regard as your role(s) in addressing the challenges faced?

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## Appendix 2: Smallholder mango farmers' questionnaire

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**TRANSACTION COSTS OF MARKET PARTICIPATION BY SMALL HOLDER MANGO FARMERS IN VHEMBE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA**

**CENTRE FOR RURAL DEVELOPMENT AND POVERTY ALLEVIATION**

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**PRIVATE BAG X 5050**

**THOHOYANDOU**

**0950**

**TEL NO: 015 962 8000**

**Strictly Confidential**

This information is confidential and the name and address of the respondents will not be divulged for any purpose other than for this study.

Name of the organization:.....

Position in the organization:.....

Tel No:.....

Cell No:.....

Respondent's remarks:

.....

.....

Interviewer's remarks:

.....

.....

Interviewer:..... Date completed:.....

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## SECTION A

## 1. BACKGROUND INFORMATION

NB. Please circle (O) or tick (√) in the correct space.

1.1 Gender

| | |
|---|---|
| Male | 1 |
| Female | 2 |

1.2 What is the highest level of education you attained?

| | |
|---|---|
| None | 1 |
| Primary | 2 |
| Secondary | 3 |
| Tertiary | 4 |

1.3 In which age group do you fall?

| | |
|---|---|
| 15-20 years | 1 |
| 21-29 years | 2 |
| 30-39 years | 3 |
| 40-49 years | 4 |
| 50-59 years | 5 |
| 60-69 years | 6 |
| 70 years and above | 7 |

1.4 How many members are there in your immediate family?

| | |
|---|---|
| None | 1 |
| 1-3 | 2 |
| 4-5 | 3 |
| 6-9 | 4 |
| 10-12 | 5 |
| Other, specify | 6 |


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1.5 What is the total number of your family members who are involved in mango farming?

| | |
|---|---|
| None | 1 |
| 1-3 | 2 |
| 4-5 | 3 |
| 6-9 | 4 |
| 10-12 | 5 |
| Other, specify | 6 |

1.6 How many people do you employ in your farm?

| Number of employees | Male | Female |
|---|---|---|
| 1-3 | | |
| 4-6 | | |
| 7-10 | | |
| Other | | |

1.7 What type of mango farming do you practice? (Choose one from the list below)

| | |
|---|---|
| Mango – Irrigation | 1 |
| Mango – Dryland | 2 |
| Both irrigation and dryland mango farming | 3 |

1.8 What is the size of your farm?

| | |
|---|---|
| Up to 1 Ha | 1 |
| 2 – 3 Ha | 2 |
| 4 – 5 Ha | 3 |
| 5 and above (specify) | 4 |

1.9 What varieties of mangoes are you producing in your farm?

| Mango type you are producing | Area | Quantity | Income |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |

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1.10 Complete the table below, indicating your mango sales in the past 5 years?

| Indicate mango type | Quantity | Price | Total Revenue |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| TOTAL | | | |

**SECTION B**

**Instruction:** To what extent do you agree with the following statements? Use a scale of 1 (Totally disagree) to 10 (Strongly agree). The higher the score you award, the greater the extent to which you agree with the statement or view

2.1 What is a smallholder mango farmer?

| **Definition of Smallholder mango farmer** | **Level of Agreement** |
|---|---|
| a) A smallholder mango farmer is a grower, farming in less than 5ha of land, producing low volumes and with limited access to markets | |
| b) Smallholder mango farmer is a grower who does not have enough farming equipment, money and has limited amount of land | |

2.2 In your own opinion, what does livelihood mean?

| **Definition of livelihoods** | **Levels of Agreement** |
|---|---|
| a) Ability to sustain your life through farming | |
| b) A way a sustainable income is derived from the product or service offered | |

2.3 What do you think Smallholder Mango farming contributes to rural livelihoods or the local economy in Vhembe District?

| **Contribution of Small holder mango farming to rural livelihoods/local economy** | **Levels of Agreement** |
|---|---|
| a) Provides income used to pay school fees, buy groceries, build homes | |
| b) Enhances food security by providing nutritious foods | |
| c) Reduces crime and poverty by providing employment | |

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| | |
|---|---|
| d) Contributes to local economy through payment of taxes | |
| e) Creates employment | |

2.4 What challenges do smallholder mango farmers face with respect to production?

| Challenges small holder mango farmers in production | Levels of Agreement |
|---|---|
| m) Not enough land for farming | |
| n) Unavailability of commercial cultivars | |
| o) Lack of technical skills (e.g. pest control, pruning, fertilization) | |
| p) Lack of farming implements/equipment | |
| q) Lack of financial support to buy inputs | |
| r) Lack of on-farm infrastructure (e.g. irrigation systems) | |
| s) Inadequate labour | |
| t) Poor quality of products due to high production costs | |
| u) Natural disasters such as drought or excessive heat | |
| v) Theft | |
| w) Pests that attack the mangoes before harvesting | |
| x) Considerable losses mainly due to rotting | |

2.5 What challenges do smallholder mango farming face in processing?

| Challenges smallholder mango farmers face in processing | Levels of Agreement |
|---|---|
| d) Inadequate technical knowledge and skills relating to mango processing | |
| e) Lack of finance to buy processing facilities | |
| f) Lack of facilities for processing | |

2.6 What challenges do smallholder mango farmers face relating to marketing?

| Challenges smallholder mango farmers face in marketing | Levels of Agreement |
|---|---|
| m) Mainly produce varieties that are not so much in demand | |
| n) Products are of poorer quality compared to those for competitors | |
| o) Long distance between farm and markets | |
| p) High cost of getting fruits to the market | |
| q) Lack of knowledge of the value chain, i.e. from farm gate to consumers | |
| r) Lack of marketing facilities | |
| s) Not having a shareholding stake in the lucrative markets | |
| t) A market that discriminates small-scale mango farmers | |
| u) No voice or control in lucrative markets | |

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| | |
|---|---|
| v) Inability to maximize opportunities that the value chain presents | |
| w) Lack of markets | |
| x) Poor road infrastructure between the farms and lucrative marketing centers | |

2.7 What causes the challenges that the smallholder mango farmers face?

| **Causes of challenges smallholder mango farmers face in production, marketing and processing** | **Level of Agree ment** |
|---|---|
| **Production** | |
| f) Lack of access to funding to grow or expand farming capacity | |
| g) Lack of relevant training in mango farming as a business | |
| h) Theft of produce | |
| i) Vandalisation of farming implements and infrastructure | |
| j) Most farmers have low levels of education | |
| **Marketing** | |
| d) Agricultural policies make it difficult for smallholder mango farmers to play a more active role | |
| e) Most producers do not take farming as a business | |
| f) Lack of training in marketing | |
| **Processing** | |
| c) Lack of processing skills | |
| d) Lack of processing infrastructure | |

2.8 Based on the causes of the challenges that the small holder mango farmers face, what do you think must be done and by whom?

| **Causes of challenges small holder mango farmers face in production, marketing and processing** | **Solution/interventio n** | **Responsible Stakeholder** | **Levels of Agree ment** |
|---|---|---|---|
| **Production** | | | |
| a)No knowledge of improved production technology | -Provide training in advanced, profitable production technology | -Extension officers<br>-NGOs<br>-Research Institutions(e.g. ARC, Colleges, Universities) | |
| b)There is little or no use | -Provide training in | -Extension | |


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| | | | |
|---|---|---|---|
| of fertilizers and pesticides | proper usage of fertilizers and pesticides as well as application methods | officers<br>-ARC, colleges and universities<br>-South African Mango Growers Association | |
| c)Poor crop management practice | -Offer on-farm trainings on crop management | -Extension officers<br>-Universities | |
| d)Inadequate post-harvest handling facilities | -Provision of facilities | -Local Economic Development (LED) offices<br>-Department of Agriculture | |
| d)Poor infrastructure | -improve available infrastructure and construction additional infrastructure | -LED offices<br>-Department of Agriculture | |
| e)Reorganization of household labour | -Appropriately distribute labour amongst household members | -Farmers | |
| f)Poor organization of farmers | -work as a collective<br>-Organize team building workshops for members of farmer organizations<br>-Train leaders of farmer organizations in leadership and management<br>-Carry out an organizational capacity assessment of farmer organizations and develop intervention plan | -Farmers' organizations<br>-Extension and LED officers<br>-Universities<br>-Extension and LED officers<br>-Universities<br>-Extension and LED officers<br>-Universities | |
| g)Poor supervision of workers on farms | -Continuously supervise workers and the farm<br>-Provide training in farm supervision | -Farmers<br>-Extension officers<br>-universities | |
| h)Little or no financial support to buy inputs | -Provide financial support through grants and loans | -LED offices<br>-Department of Agriculture | |

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| | | | |
|---|---|---|---|
| | | -Land bank | |
| i)Shortage of grafted seedlings | -Supply seedlings of commercial varieties | -ARC<br>-Mango processors<br>-Department of Agriculture<br>-Colleges and universities | |
| j)Agricultural policies not user-friendly to small holder farmers | -Develop policies which promote small holder farming<br>-Organize policy debates or structured deliberations on smallholder mango farming | -Department of Agriculture<br>-Department of Rural Development and Land Reform<br>-Universities | |
| **Marketing** | | | |
| a)Long distances between farms and markets | -Provide local deports for fruit collection and storage | -Mango processors<br>-LED offices | |
| b)High costs of transporting/transferring the product to its destination | -Provide group transport to the market | -Vhembe Fresh Produce Market<br>-LED offices | |
| c)Poor road infrastructure from the farms to the market | -Construct and regularly grade roads linking farms and major public roads | -Department of Roads and Transport | |
| d)Lack of relevant information on alternative marketing possibilities and product uses | -Provide adequate marketing information | -Extension officers<br>-SEDA<br>-LIBSA<br>-LED offices | |
| e)Supply not well organized/aligned with collecting, grading and packing facilities | -Train farmers on aspects of mango value chain | -Extension officers<br>-Mango processors<br>-Market Agents<br>-LED officers | |
| f)Inadequate post-harvest/husbandry control | -Provide training in post-harvest handling of products | -Extension officers<br>-Mango processors<br>-LED officers<br>-SEDA<br>-LIBSA<br>- Universities | |


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| | | | |
|---|---|---|---|
| g)Varieties grown are inappropriate for national and export markets | -Provide information about commercial varieties<br>-Produce new varieties through research and breeding | -Extension officers<br>-Market agents<br>-Research Institutions (ARC, Colleges and Universities)<br>-Universities and research institutions | |
| h)Lack of marketing facilities | -Provide marketing facilities<br>-Investigate new marketing possibilities/options | -LED offices<br>-Department of Agriculture<br>-Farmers' organizations, LED Officers and universities | |
| i) High costs of screening partners, bargaining, monitoring and enforcement of partnership. | -Facilitate the establishment of strategic partnerships | -LED offices<br>-Extension officers<br>-SEDA<br>-LIBSA | |
| j)Fluctuating product prices in local, national and export markets | -Regularly provide farmers with adequate information on how the various markets operate | -Extension officers<br>-Market agents<br>-SEDA<br>-LIBSA | |
| k)Failure to comply with market traceability standards such as EUROGAP and others | -Organize orientation workshops where farmers obtain reliable information on standards that national and international markets require | -Market agents<br>-Extension officers<br>-Universities<br>-LED Officers | |
| l)Lack of voice in input and product markets | -Empower farmers to secure shares in the markets<br>-Strengthen farmer organizations | -LED offices<br>-SEDA<br>-LIBSA<br>-Universities<br>-Extension officers | |
| **Processing** | | | |


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| | | | |
|---|---|---|---|
| a)Insufficient per capita (farm) production capacity coupled with weak/poor organization of farmers | -Organized and strengthen farmers' operational capacities in order to supply enough fruits as a collective for processing<br>-Organize exposure visits for purposes of learning from others who are successful | -Farmers<br>-Farmers Commodity Association Committee<br>-Extension officers and LED officers | |
| b)Lack of processing facilities | -Construct processing facilities<br>-Develop new processing techniques/technologies | -LED offices<br>-Department of Agriculture<br>-SEDA<br>-LIBSA<br>-Universities and research institutions | |
| c)Inadequate processing skills | -Provide need-based training in processing technology<br>-Organize exposure visits to other areas locally and internationally for purposes of learning<br>-Organize demonstration sessions for farmers | -NGOs<br>-ARC, Colleges and Universities<br>-Department of Agriculture<br>-SEDA<br>-LIBSA<br>-Extension officers and LED officers<br>-Extension officers and LED officers | |

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## Appendix 3: Consumer survey's questionnaire

**TRANSACTION COSTS OF MARKET PARTICIPATION BY SMALL HOLDER MANGO FARMERS IN VHEMBE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA**

**CENTRE FOR RURAL DEVELOPMENT AND POVERTY ALLEVIATION**

**UNIVERSITY OF VENDA**

**PRIVATE BAG X 5050**

**THOHOYANDOU**

**0950**

**TEL NO: 015 962 8000**

**Strictly Confidential**

This information is confidential and the name and address of the respondents will not be divulged for any purpose other than for this study.

Name of respondent:……

Tel No:……

Cell No:……

Respondent's remarks:

……

……

Interviewer's remarks:

……

……

Interviewer:…… Date completed:……


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**NB. Please circle (O) or tick (√) in the correct space.**

1. Gender

| | |
|---|---|
| Male | 1 |
| Female | 2 |

2. What is the highest level of education you attained?

| | |
|---|---|
| None | 1 |
| Primary | 2 |
| Secondary | 3 |
| Tertiary | 4 |

3. In which age group do you fall?

| | |
|---|---|
| 15-20 years | 1 |
| 21-29 years | 2 |
| 30-39 years | 3 |
| 40-49 years | 4 |
| 50-59 years | 5 |
| 60-69 years | 6 |
| 70 years and above | 7 |

4. How often do you eat mangos?

| | |
|---|---|
| Seldom | 1 |
| About five times per year | 2 |
| About twice per month | 3 |
| Weekly | 4 |
| Daily | 5 |

5. Do you like fresh mango?

| | |
|---|---|
| Very much | 1 |
| Some what | 2 |
| Not at all | 3 |

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6. Have you ever bought fresh mango?

| | |
|---|---|
| Yes | 1 |
| No | 2 |

7. Are you buying more fresh mango this year than you did last year?

| | |
|---|---|
| Yes | 1 |
| No | 2 |

8. If you do not buy fresh mangos, what are your reasons?

| | |
|---|---|
| Too sour | 1 |
| Difficult to prepare | 2 |
| Difficult to store | 3 |
| Price too high | 4 |
| Too fibrous | 5 |
| Other fruits taste better | 6 |
| Other (specify……) | 7 |

9. Have you bought processed mango (canned, archar, juice, dried, etc) during the:

| | |
|---|---|
| Past month | 1 |
| Past year | 2 |
| Do not recall | 3 |

10. If you do not buy processed mango, what are your reasons?

| | |
|---|---|
| Too sour | 1 |
| Too sweet | 2 |
| Difficult to prepare | 3 |
| Price too high | 4 |
| Other fruits taste better | 5 |
| Other (specify….) | 6 |

11. Which do you like most? (If your answer is 1, please proceed to Question 12 and if it's 2 proceed to Question 13)

| | |
|---|---|
| Fresh mango | 1 |
| Processed mango | 2 |

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12. Why do you prefer fresh mango rather than processed?

| | |
|---|---|
| Tastes better | 1 |
| No sugar added | 2 |
| Cheaper | 3 |
| Better flavor | 4 |
| No preservatives added | 5 |
| Other (specify…) | 6 |

13. Why do you prefer processed mango rather than fresh?

| | |
|---|---|
| More convenient to use | 1 |
| More convenient to store | 2 |
| Taste better | 3 |
| Cheaper | 4 |
| Other (specify….) | 5 |

14. Last time you bought fresh mango, did you:

| | |
|---|---|
| Plan to buy it before entering the store/market | 1 |
| Plan to buy fruits and decided on mango because it looked good in the display | 2 |
| Plan to buy processed mango but bought fresh mango instead because it looked good in display | 3 |
| Didn't plan to buy fruit but bought mango because it looked good in the display | 4 |

15. Based on your knowledge of fresh mango, would you say the price is:

| | |
|---|---|
| Reasonable in relation to other fresh fruit | 1 |
| Too high in relation to other fresh fruit | 2 |

16. What do you consider good substitutes for fresh mango?

| | |
|---|---|
| Processed mango | 1 |
| Papayas | 2 |
| Pears | 3 |
| Oranges | 4 |
| Other (specify…) | 5 |


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17. What is your opinion of the taste of fresh mangos?

| | |
|---|---|
| Just right | 1 |
| Too sour | 2 |
| Too sweet | 3 |
| Too acidic | 4 |
| Other (specify…) | 5 |

18. Which variety of mango is your favourite?

| | |
|---|---|
| Tommy Atkins | 1 |
| Sensation | 2 |
| Kent | 3 |
| Keit | 4 |
| Heidi | 5 |
| Sugar (Indigenous) | 6 |
| No preference | 7 |

19. What external colour do you look for when buying fresh mango?

| | |
|---|---|
| Golden yellow | 1 |
| Green | 2 |
| Inbetween | 3 |
| Don't pay attention to colour | 4 |

20. when you shop for fresh mango, do you want them

| | |
|---|---|
| Firm | 1 |
| Soft | 2 |
| Inbetween | 3 |
| Don't know | 4 |

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**Appendix 4: Ethical Clearance**

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## UNIVERSITY HEALTH, SAFETY AND RESEARCH ETHICS COMMITTEE

### RESEARCH ETHICS PROTOCOL

Any project in which humans are the subject of research requires completion of this form and submission, for approval, to the appropriate Faculty Health, Safety and Research Ethics Committee which shall recommend the application to the University Health, Safety and Research Ethics Committee (HSREC).

### INITIATING DEPARTMENT:

<table>
<tr><td rowspan="4">FACULTY (HSREC)</td><td>Submitted</td><td>Day</td><td>Month</td><td>Year</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>.....<br>Approved</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Authorized by: (School Deputy Dean)</td></tr>
<tr><td colspan="5"></td></tr>
</table>


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| | | Day | Month | Year |
|---|---|---|---|---|
| **UNIVERSITY (HSREC)** | **Submitted** | | | |
| | ..... **Approved** | | | |
| | **Authorized by: (Chairperson: Faculty HSREC)** | | | |

## 1. GENERAL PARTICULARS

**(a) Name of Principal Investigator**

Mr. Takalani Thakhani Kennedy

**Name/Address/Telephone number of Principal Investigator:**

Name: Mr. Takalani Thakhani Kennedy

Address: P.O. Box 2861

Thohoyandou, 0950

Telephone: 082 446 0921

Signature: _____


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**(b) Title of Research: A Cooperative Model for Enhancing Market Participation by Smallholder Mango Farming in Vhembe District of Limpopo Province, South Africa**

Type of Research:

(i) Local Research (L)
(ii) Research (Student ST);
(iii) PhD ; in which case specify: PhD in Rural Development
**(iv)** If Medical: Therapeutic Research (TR); Non-Therapeutic Research (NTR)**(N/A)**

**(c) Funding**

(i) Contract Research/External Grant (E);
(ii) What is the purpose of the Research?
(iii) To improve Market Participation by Smallholder Mango Farming in Vhembe District of Limpopo Province, South Africa

**(d) Summary of Research**

(i) What is the purpose of the Research?
(ii) To improve Market Participation by Smallholder Mango Farming in Vhembe District
(iii) Briefly state the methodology and the procedures in which subjects will be asked to participate. (see table 1)

- Two hundred and nineteen (219) smallholder mango farmers in Vhembe District will constitute the population of this study. The sample will be selected from the District's four local municipalities, namely: Thulamela (115); Makhado (74); Mutale (24) and musina (6).
- The following key stakeholders who work closely with smallholder mango farmers will be interviewed using key informant interview guide.

- Vhembe Local Economic Development Section (Agriculture Officer)
- South African Mango Growers Association (SAMGA)
- Department of Agriculture (National, Provincial and Local)
- Mango Processors
- Trade and Investment Limpopo
- Department of Trade and Industry
- Vhembe District Mango Commodity Association


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**(e) Name(s) of the Investigator(s)/Researcher(s) (Whether student or staff member) most involved in this project or study**

**Mr. T.K. Takalani**

**Prof J Francis**

**Prof. G.R.A Mchau**

**Dr. J. Zuwarimwe**

**(f) Names of Co-Investigators/Assistant Researchers**

**2. INFORMATION TO SUBJECT**

(a) What information will be afforded to subjects before they consent to participate? Append the written or oral information given to the subject.

(b) Who will provide this information? (Takalani T.K, Principal Investigator)

(c) Investigator/Researcher, Student, Research Assistant etc.

(d) Will the information provide be complete and accurate? YES

**3. TARGET SUBJECT GROUP:**

| | Answer Yes/No | If necessary, explain in space provided or attached appendix. |
|---|---|---|
| Are particular characteristics of any kind required in the target group (e.g. age, cultural derivation, background, physical characteristics, disease states, etc)? | Yes | Only Smallholder mango farmers will be selected for the study. |



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| | | |
|---|---|---|
| | | |
| Are Subjects drawn from Univen students at large? | No | |
| Are Subjects drawn from specific groups of Univen students? | No | Identify the Group |
| Are subjects drawn from a School Population? | No | Identify:<br><br>(State whether Pre-primary, Primary, Secondary, etc) |
| Are subjects drawn from an institutional population? (e.g. Hospital, Prison, | No | Identify: |
| Are the subjects drawn from within local community or outside local community | Yes | Vhembe district Municipality |
| Will any records be consulted for | No | Specify Source of Records |


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| | | |
|---|---|---|
| information? | | |
| Will individual subjects know their records are being consulted? | | State how these records will be obtained: |
| Are all subjects over 21 years of age? | Yes | If No, state justification for inclusion of minors in study and proof of authorization from appropriate authority |

| | | |
|---|---|---|
| State the minimum and maximum Number of Subjects involved: | **minimum** | 150 |
| | **maximum** | 800 |

(Minimum number should reflect the number of subjects necessary to make the study statistically viable).


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## 4. RISKS AND BENEFITS OF PROJECT

| | Answer<br><br>Yes/No | If Yes, specify: |
|---|---|---|
| Are all risks reversible? | | If No, specify: |
| Are remedial measures available? | | |
| Are alternative procedures available? | | |
| Has the person administering the project previous experience with the particular risk factors involved? | | |
| Are any benefits expected to accrue to the Subject personally? (e.g. improved health, mental state, financial, etc) | | If Yes, specify: |


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| | | |
|---|---|---|
| | | |
| Will you be using equipment of any sort? | | If Yes, specify: |
| Will any article of property, personal or cultural, be collected in the course of this project? | | If Yes, specify: |

## 5. CONSENT OF SUBJECTS

| | | |
|---|---|---|
| Is consent to be given in writing? | Answer<br>Yes | See Appendix 3 |
| Do any subjects suffer from a legal disability preventing them from giving effective informed consent (e.g. under 21 years, declared insane by a court of law, unconscious, etc) | No | If Yes, specify: |


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| | | |
|---|---|---|
| Do any subjects operate in an institutional environment which may cast doubt on the voluntary aspect of consent? | No | If Yes, state what special precautions will be taken to obtain a legally effective informed consent: |
| Will subjects receive remuneration for their participation? | No | If Yes, state on what basis the remuneration is calculated: |
| Do you require consent of an institutional authority for this project? | No | If Yes, specify: |
| Will the subject be informed of their rights to withdraw from the project at any time, even after the consent is given and the project commences? | Answer<br>Yes | |
| Will the subjects be fully aware if a foreseeable risk exists and will they be required to give a waiver if any claim arises from the | Yes | See appendix 3 |


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| | | |
|---|---|---|
| research? | | |

## 6. PRIVACY, ANONYMITY AND CONFIDENTIALITY OF DATA

| | Answer Yes/No | If necessary, explain in the space provided or attach appendix |
|---|---|---|
| Are provision made to protect subject's rights to privacy and anonymity and to preserve confidentiality with respect to data? | Yes | Specify: see Appendix 3 |
| Will mechanical methods of observation be used? (e.g. one-way mirrors, recordings, videos, etc) | Yes | Specify: tape recorder |
| Will subjects' consent to such mechanical methods of observation be obtained? | Yes | If no, give reasons |

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| | | |
|---|---|---|
| | | |
| Will data collected be stored in any way? | No | If Yes (a) whom:<br><br>(b) How many copies:<br><br>(c) For how long:<br><br>(d) For what reasons:<br><br>(e) How will the subject's anonymity be protected: |
| Will stored data be made available for re-use? | No | If Yes, how will subjects consent be obtained for such re-usage: |
| Will any part of the project be conducted on private property (includes shopping centres)? | Yes | If Yes, specify and state how consent of property owner is to be obtained: will be obtained from Vhembe District Municipality manager |

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| | | |
|---|---|---|
| | | |

## 7. FEEDBACK

| | Answer<br><br>Yes/No | If necessary, explain in space provided or attach appendix |
|---|---|---|
| Will feedback be given to subjects? | Yes | Feedback will be given in written form to all participants in a group setting after the entire project complete; (all participants will be invited to an organized feedback session. Participants will be given results of the study in a written form for verification and quantification. Where they see gaps of information they will be allowed to add. |
| If you are working in a school or other institutional setting will you be providing teachers, parents, school authorities or equivalent a copy of your results? | N/A | Specify: |


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| | | |
|---|---|---|
| | | |

DECLARATION: IF ANY CHANGES ARE MADE TO THE ABOVE ARRANGEMENTS OR PROCEDURES, WE WILL BRING THESE TO THE ATTENTION OF THE CHAIRPERSON OF THE UNIVERSITY HEALTH, SAFETY AND RESEARCH ETHICS COMMITTEE OR APPROPRIATE SCHOOL (HSREC) HEALTH, SAFETY AND RESEARCH ETHICS COMMITTEE

THE UNDER SIGNED DECLARE THEMSELVES ACCOUNTABLE TO THE UNIVERSITY HEALTH, SAFETY AND RESEARCH ETHICS COMMITTEE FOR CONDUCTING THIS RESEARCH PROJECT IN THE MANNER HEREIN DESCRIBED AND IN ACCORDANCE WITH THE SPIRIT OF THE ETHICAL GUIDELINES OF THIS UNIVERSITY. WE UNDERTAKE TO ASSUME RESPONSIBILITY TO ADVISE THE ETHICAL COMMITTEE PROMPTLY OF ANY DEVIATIONS OR IRREGULARITIES OCCURRING DURING THE CONDUCT OF THIS RESEARCH PROJECT.

**Signatures of other Researchers involved in this Project:**

_____

_____

_____ _____

**SIGNATURE OF PROJECT SUPERVISOR** **DATE**



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## NAME OF RESEARCHER/INVESTIGATOR:

**TAKALANI TK**
**STUDENT NO. 11560229**

**PROJECT TITLE:** TRANSACTION COSTS HINDERING MARKET PARTICIPATION BY SMALL-HOLDER MANGO (MANGIFERA INDICA L.) FRAMERS IN VHEMBE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA

**PROJECT NO:** SARDF/12/FST/01/0112

### SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

| NAME | INSTITUTION & DEPARTMENT | ROLE |
|---|---|---|
| Prof. J Francis | University of Venda | Supervisor |
| Dr J Zuwarimwe | University of Venda | Co-supervisor |
| Prof. G.R.A. Mchau | University of Venda | Co-supervisor |
| Mr TK Takalani | University of Venda | Investigator - Student |

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**ISSUED BY:**
**UNIVERSITY OF VENDA, HEALTH, SAFETY AND RESEARCH ETHICS COMMITTEE**

Date Considered: January 2012
Decision by Ethical Clearance Committee Granted
Signature of Chairperson of the Committee: .....
Name of the Chairperson of the Committee: Prof. C.V. Nikodem

University of Venda
PRIVATE BAG X5050, THOHOYANDOU, 0950λ LIMPOPO PROVINCEλ SOUTH AFRICA
TELEPHONE (015) 962 8504/8484 /8313 FAX (015) 962 8439
*"A quality driven financially sustainable, rural-based Comprehensive University"*

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## Appendix 5: INFORMATION SHEET

The researcher has realized the need to improve market participation by smallholder mango farming in Vhembe District. We are therefore pleased to inform you that you are selected as one of the respondents to participate in this study.

Please understand that you are not being forced to take part in this venture and the choice whether to participate or not are yours alone. However, we would really appreciate it if you could take part in this exercise as it may assist us to find ways of improving your farming activities and thus leading to improved economic activities in the district. If you choose not to take part in answering these questions, you will not be affected in any way whatsoever. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this, there will also be no penalties and you will NOT be prejudiced in ANY way. When it comes to answering questions there are no right and wrong answers. The research will hold no risks for you or to any other member of your community. All information that you give to us will be kept confidential and you will not be identified by name or address in any of the reports that we plan to write.

If you would like some more information about the research process please feel free to contact Vhembe District Municipal manager. You may also contact the research investigators at 015 962 8079/ 015 962 8829/ 015 962 8052.

## DECLARATION BY FIELDWORKER

I ----------hereby declare that I explained to the respondent that he or she is participating freely in this research. I also explained to the respondent that he or she may stop this interview at any point and that such a decision would not in any way affect him/her negatively.

I explained to the respondent that this is a research project whose purpose is not necessarily to benefit him or her personally.

I explained to the respondent that the answers he or she will provide during the interview would remain confidential.

**Signature of Enumerator**---------- **Date**----------


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**Figure 3.1 Limpopo Provincial map showing all its five constituent Districts**



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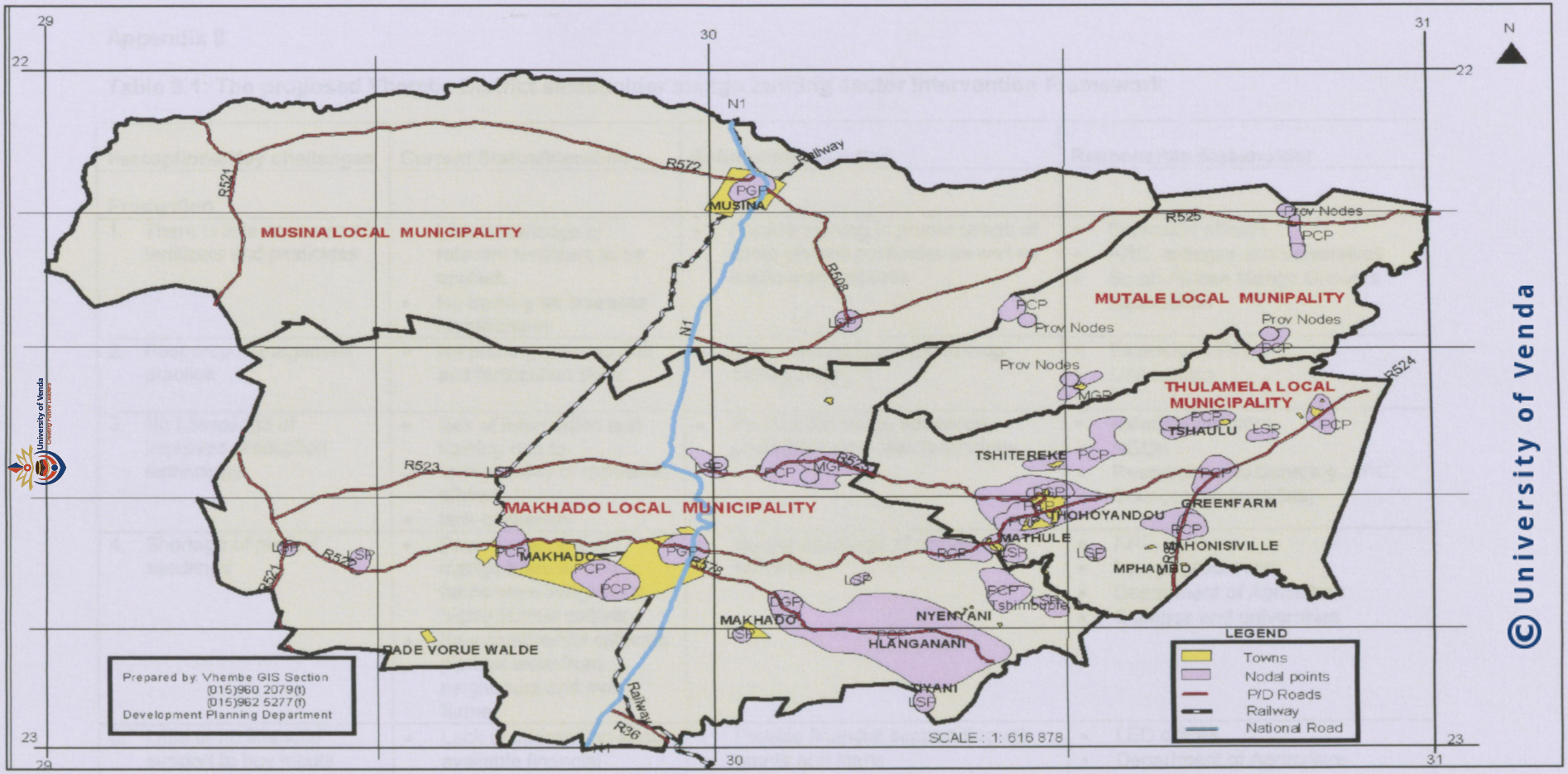


**Figure 3.2 Location of Vhembe District showing the four Local Municipalities**

## Appendix 8

### Table 8.1: The proposed Vhembe District smallholder mango farming sector Intervention Framework

| Perceptions/Key challenges | Current Status/literature | Solution/intervention | Responsible Stakeholder |
|---|---|---|---|
| **Production** | | | |
| 1. There is little or no use of fertilizers and pesticides | • Little knowledge of relevant fertilizers to be applied.<br>• No training on diseases identification | • Provide training in proper usage of fertilizers and pesticides as well as application methods | • Extension officers<br>• ARC, colleges and universities<br>• South African Mango Growers Association |
| 2. Poor crop management practice | • No pruning, pest control and fertilization skills. | • Offer on-farm trainings on crop management | • Extension officers<br>• Universities |
| 3. No knowledge of improved production technology | • lack of information and training due to unavailability of extension officers<br>• lack of finance | • Provide training in advanced, profitable production technology | • Extension officers<br>• NGOs<br>• Research Institutions(e.g. ARC, Colleges, Universities) |
| 4. Shortage of grafted seedlings | • Seventy percent of mango trees in their farms were indigenous highly fibrous cultivars.<br>• Few commercial cultivars planted were from neighbours and own farms | • Supply seedlings of commercial varieties | • ARC<br>• Mango processors<br>• Department of Agriculture<br>• Colleges and universities |
| 5. Little or no financial support to buy inputs | • Lack of information about available financial assistance<br>• Lack of collateral and bank accounts | • Provide financial support through grants and loans<br>• Conduct workshops to inform farmers about the available public and private financial support programme | • LED offices<br>• Department of Agriculture<br>• Land bank |
| 6. Poor infrastructure | • No farming related | • Improve available infrastructure and | • LED offices |



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| | infrastructure such as tractors and irrigation system. | construction of additional infrastructure | • Department of Agriculture |
| 7. Poor organization of farmers | • Farmers operating in silos and reluctant to join the organized mango commodity association, which affiliated to the South African Mango Growers Association | • Work as a collective<br>• Organize team building workshops for members of farmer organizations<br>• Train leaders of farmer organizations in leadership and management<br>• Carry out an organizational capacity assessment of farmer organizations and develop intervention plans | • Farmers' organizations<br>• Extension and LED officers<br>• Universities<br>• Extension and LED officers<br>• Universities<br>• Extension and LED officers<br>• Universities |
| 8. Inadequate post-harvest handling facilities | • Lack of post-harvest fruit handling training<br>• Lack of cold storage rooms | • Provision of facilities | • Local Economic Development (LED) offices<br>• Department of Agriculture |
| 9. Agricultural policies not user-friendly to small holder farmers | • Smallholder farmers forced to compete with the developed and funded commercial farmers in the same markets due to the unregulated markets policy. | • Develop policies which promote small holder farming<br>• Organize policy debates or structured deliberations on smallholder mango farming | • Department of Agriculture<br>• Department of Rural Development and Land Reform<br>• Universities |
| 10. Reorganization of household labour | • Youth not interested in farming activities. | • Appropriately distribute labour amongst household members | • Farmers |



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| Marketing | | | |
|---|---|---|---|
| 1. Fluctuating product prices in local, national and export markets | • Lack of representatives in the market to look after the interests of smallholder farmers | • Regularly provide farmers with adequate information on how the various markets operate | • Extension officers<br>• Market agents<br>• SEDA<br>• LIBSA |
| 2. High costs of screening partners, bargaining, monitoring and enforcement of partnership. | • No existing partnerships. | • Facilitate the establishment of strategic partnerships | • LED offices<br>• Extension officers<br>• SEDA<br>• LIBSA |
| 3. High costs of transporting/transferring the product to its destination | • Smallholder farmers resorting to selling their produce at farm gate and spot markets | • Provide group transport to the market | • Vhembe Fresh Produce Market<br>• LED offices |
| 4. Long distances between farms and markets | • Smallholder farmers not participating in lucrative markets due to distance. | • Provide local deports for fruit collection and storage | • Mango processors<br>• LED offices |
| 5. Poor road infrastructure from the farms to the market | • Quality of fruits being affected when transported due to bruising<br>• Transport operators charge higher prices. | • Construct and regularly grade roads linking farms and major public roads | • Department of Roads and Transport |
| 6. Supply not well organized/aligned with collecting, grading and packing facilities | • No knowledge of mango commodity value chain | • Train farmers on aspects of mango value chain | • Extension officers<br>• Mango processors<br>• Market Agents<br>• LED officers |
| 7. Lack of voice in input and product markets | • Experience continuous discrimination due to lack of representatives. | • Empower farmers to secure shares in the markets<br>• Strengthen farmer organizations | • LED offices<br>• SEDA<br>• LIBSA<br>• Universities<br>• Extension officers |
| 8. Varieties grown are | • Seventy percent of fruit | • Provide information about | • Extension officers |



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| | | | |
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| inappropriate for national and export markets | trees in farms are indigenous cultivars suitable for local and green mango atcha market.<br>• Commercial cultivars in grown in farms not sprayed for pest diseases. | commercial varieties<br>• Produce new varieties through research and breeding | • Market agents<br>• Research Institutions (ARC, Colleges and Universities)<br>• Universities and research institutions |
| 9. Lack of relevant information on alternative marketing possibilities and product uses | • Majority of smallholder farmers not literate and rely totally on extension officers.<br>• Extension officers not transferring information to smallholder farmers. | • Provide adequate marketing information | • Extension officers<br>• SEDA<br>• LIBSA<br>• LED offices |
| 10. Failure to comply with market traceability standards such as EUROGAP and others | • Not trained on market traceability standards.<br>• Poor farming practice due to financial constraints | • Organize orientation workshops where farmers obtain reliable information on standards that national and international markets require | • Market agents<br>• Extension officers<br>• Universities<br>• LED Officers |
| 11. Lack of marketing facilities | • One fresh produce market within the Vhembe District and not fully functional<br>• Two formal traditional markets (Tshakhuma and Lwamondo) but both in the Makhado Local Municipality with the Fresh produce market | • Provide marketing facilities<br>• Investigate new marketing possibilities/options | • LED offices<br>• Department of Agriculture<br>• Farmers' organizations, LED Officers and universities |
| 12. Inadequate post-harvest control | • Over 60 % of mangos rotting in farms due to lack of post harvest knowledge and facilities. | • Provide training in post-harvest handling of products | • Extension officers<br>• Mango processors<br>• LED officers<br>• SEDA<br>• LIBSA<br>• Universities |



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| Processing | | | |
|---|---|---|---|
| 1. Lack of processing facilities | • No functional government funded processing facility in the district.<br>• Smallholder farmers being exploited by private green mango processors by purchasing their mangos at low prices. | • Construct processing facilities<br>• Develop new processing techniques/technologies | • LED offices<br>• Department of Agriculture<br>• SEDA<br>• LIBSA<br>• Universities and research institutions |
| 2. Inadequate processing skills | • Extension officers' lack of knowledge in processing is affecting introduction of processing or value addition. | • Provide need-based training in processing technology<br>• Organize exposure visits to other areas locally and internationally for purposes of learning<br>• Organize demonstration sessions for farmers | • NGOs<br>• ARC, Colleges and Universities<br>• Department of Agriculture<br>• SEDA<br>• LIBSA<br>• Extension officers and LED officers<br>• Extension officers and LED officers |
| 3. Insufficient per capita (farm) production capacity coupled with weak/poor organization of farmers | • Farmers not well organised since they are not all members of the mango commodity association<br>• Production capacity in Smallholder farming is not reliable due to post harvest losses. | • Organize and strengthen farmers' operational capacities in order to supply enough fruits as a collective for processing<br>• Organize exposure visits for purposes of learning from others who are successful | • Farmers<br>• Farmers Commodity Association Committee<br>• Extension officers and LED officers |



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