EFFECT OF ENTERPRISE DEVELOPMENT SUPPORT PROGRAMME ON MARKET PARTICIPATION AND PROFITABILITY OF INDIGENOUS VEGETABLE FARMERS IN SOUTH AFRICA

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Dissertation submitted in fulfilment of the requirements for the degree *Masters* in Agricultural Economics at the Mafikeng Campus of the North-West University

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Graduation October 2017

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January 2017

Dedication

This study is dedicated to the following: Sebinane and Sekoala. Thank you for always being there for me; my late mother in-law; I know how much you wanted me to get this far. You left fingerprints of grace on our lives. You shall never be forgotten.

Declaration

I, Kananelo Mphafi, declare that the dissertation entitled "**Effect of enterprise development support programme on market participation and profitability of indigenous vegetable farmers in South Africa**", hereby submitted for the degree of Master of Science in Agriculture (Agricultural Economics) has not previously been submitted by me for a degree at this or any other university. I further declare that this is my work in design and execution and that all materials contained herein, have been duly acknowledged.

Dated at Mafikeng, on this ....13th..... day of ..OCTOBER....., 2017.

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Kananelo Mphafi

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Supervisor: Professor A.S. Oyekale

.....P. Ndou.....

Co-supervisor: Doctor. P. Ndou

ACKNOWLEDGEMENT

First and foremost, I would like to thank God Almighty for the gift of life, for His guidance and for giving me all the strength I needed in order to pursue and complete this study.

I wish to express my sincere thanks to my supervisors, Professor A.S Oyekale and Doctor P. Ndou for their insightful comments and encouragement, but also for the tough questions that encouraged me to broaden my study.

My sincere appreciation goes to the Agricultural Research Council. Thank you for the financial support during my studies.

My sincere gratitude also goes to Mr K. Machira for his guidance during the analysis. Sir, I learned a lot from our encounter and may God continue to bless you richly.

Last but not the least, I wish to thank all the members of my family, friends, parents, brothers and sisters for supporting me spiritually during my studies. It is thanks to you all that I was able to complete this journey.

ABSTRACT

African indigenous vegetables play a very significant role in food security of poor households in both urban and rural settings. Such vegetables provide vital energy, micronutrients and act as medicinal plants to some households. Recently, some African indigenous vegetables have been underutilised. The aim of this study was to analyse the effect of enterprise development support programme on market participation and profitability of indigenous vegetable farmers in South Africa. The population of the study consisted of 86 farmers engaged in the marketing of African leafy indigenous vegetables in South Africa. Probit regression, and stochastic frontier profit inefficiency estimate were employed in the study to test for market participation and profitability respectively. The results revealed that most farmers who received support from ARC also received support from other organisations. A lot of ARC farmers (51%) were females while 58% of non-ARC farmers were males. Both groups were dominated by farmers aged 41 years and above, being all married. Farm size for both ARC and non-ARC famers was between 0.5 – 5 hectares held by 61 and 62% of farmers respectively. Most ARC farmers received support from different organisations and participated in the informal market. 34% of farmers received production training, 27% received input support while 83% received market linkage. For Non-ARC farmers who received similar support, participation was more in the formal market: production training represented 42%, input support (47%), extension support (62%) and market linkage (40%). It was found that support from the Department of Agriculture through infrastructure, assisted farmers to improve participation in markets. (37% of ARC and 58% non-ARC farmers involved in informal markets). Probit regression model was used to identify factors that influence farmers' participation in markets. The results showed that the type of vegetable increased the probability of farmers' participation in the informal market by (3.64: $P<0.005$) for spinach and (3.08608: $P<0.038$) for amaranth. A significance level of 5% was recorded for revenue, gender, cooperative membership as well as being an ARC farmer. In the second analysis, determinants of indigenous vegetable farmers' profit was tested in the study. From the results, it was established that seed and land had a negative effect on profit but were statistically significant at 10 and 1 % respectively. Interaction of variables revealed a significance level of 5% (fertiliser*fertiliser), 1% (seed*seed) and 10% (fertiliser*seed). From the results of the study, it is recommended that enterprise development support be enhanced as it is of great help to farmers. It is further recommended that enterprise support programmes be enhanced, and for input support, profitability and smallholder profit efficiency to be improved.

Keywords: Enterprise Development Programme, Market participation, Profitability, African Indigenous Vegetables

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LIST OF ABBREVIATIONS AND ACRONYMS

AIC:	Akaike Information Criterion
AIV:	African Indigenous Vegetables
ARC:	Agricultural Research Council - South Africa
DAFF:	Department of Agriculture, Forestry and Fisheries
FAO:	Food and Agriculture Organisation of the United Nations
FSP:	Farmer Support Programme
GMO:	Genetically Modified Organism
MLE:	Maximum Likelihood Estimation
MOA:	Ministry of Agriculture
NAMC:	National Agricultural Marketing Council South Africa
NWU:	North-West University
PSPPD:	Programme to Support Pro-Poor Policy Development
SAAPS:	South African Agricultural Production Strategy
STATA:	Statistical Software Package
VIF:	Variance Inflation Factor

DEFITINION OF TERMS

Profit inefficiency: Profit efficiency is a macro-economic concept used in assessing whether an economy, industry or supply chain is expending an optimally balanced level of rent for the use of capital.

Agricultural Research Council: science institution that conducts research with partners, develops human capital and fosters innovation to support and develop the agricultural sector.

Contents

CHAPTER ONE
INTRODUCTION

1.0 Background

African indigenous vegetables play a very significant role in food security of underprivileged households in both urban and rural settings (Weinbergerand Msuya 2004). African indigenous vegetables (AIVs) are a plants whose leaves, fruits or roots are usually used as vegetables by rural and urban communities through custom, habit and traditions. They are mostly important for improving food security in the South Africa and the whole wide world. Vegetables such as amaranths, spinach and mustard are important sources of food and nutrients. They have high nutritional value and contain significant levels of calcium, vitamin A, C, E, K, protein copper and many other minerals (Muhanji *et al.,* 2011). According to the Food and Agriculture Organisation, these vegetables have been sources of primary foods to many people around the world (FAO, 2010). Furthermore, they have also not only been associated with the provision of vital energy and micronutrients in the diets of isolated communities (Grivettiand Ogle, 2000), but also act as medicine (Spring, 2015). Some farmers around the world have been investing a lot in horticulture (guided by the World Food Organisation) in order to promote availability of these vegetables and ensure the physiological wellbeing of human beings. For instance, a study conducted in Botswana by Legwaila *et al.* (2011) revealed that consumption of these vegetables could help address the double burden of micronutrients deficiencies and chronic diseases.

However, in sub-Saharan Africa, the potential benefits of African indigenous vegetables have been overlooked over time due to negligence by consumers (FAO, 2005; Yang and Keding., 2009). In some developing countries, including South Africa, African Indigenous and Traditional Vegetables (AIVs) hold excellent potentials to improve nutrition and increase dietary diversity (Lotter *et al.,* 2014). A study by the World Bank (2010) found that despite the significance of vegetables to people of all ages in terms of their nutritional compositions, malnutrition remains a problem, with stunting heavily affecting neonates, infants, children and vulnerable pregnant women (Fanzo *et al.*, 2013). Lack of vegetables have led to vitamin a deficiency in about 43.6% of children and 46% of pregnant women (Shisana *et al.,* 2014).

In South Africa, there has been a shift towards non-indigenous foods by the population. This has been driven by different traditional perceptions on indigenous foods and vegetables among

the people (Taleniand Goduka, 2013). In view of this, the government of South Africa introduced numerous policies and Acts in order to promote production, consumption and marketing of African indigenous vegetables. The Food Security Policy and agricultural marketing policies that are driven by the National Agriculture Marketing Council (NAMC, 2006) was developed.

Additionally, the Farmer Support Programme (FSP), was introduced in the mid-1980s and financed by the Development Bank of Southern Africa (DBSA), aimed at supporting all sub-sectors of agronomy and horticulture in South Africa's agricultural system. The aim of FSP was to promote structural change away from subsistence agricultural production and to ensure agricultural commercialisation through the provision of comprehensive agricultural support services and incentives to existing farmers (PSPPD, 2010). In order to support government's efforts, some non-parastatal organisations such as the Agricultural Research Council (ARC) which is a premier science institution that conducts research with partners and develops human capital and fosters innovation to support and develop the agricultural sector, embarked on agricultural programmes aimed at promoting vegetable production and marketing. ARC's programmes are aimed at smallholder crop production, agro-processing, food technology and agricultural commercialisation, among others. Another non-government agency (Agri-business Development Agency) was established in 2009 with the purpose of supporting commercial farmers - mainly previously disadvantaged farmers – is based in KwaZulu Natal province.

There is dearth of studies on the marketing and significance of vegetables in South Africa. On the same note, different scholars have tried to investigate the role and contribution of vegetable marketing at national level. However, researchers who have conducted studies on vegetables and their significance in South Africa have encountered the following challenges: Chetty (2013) conducted a study on the dietary analysis of South African indigenous vegetables and traditional foods. The findings of this study were more of biochemistry and did not account for the market aspect of vegetables, more importantly, African indigenous and traditional vegetables. Mavengahama *et al.* (2013) analysed the contributions of indigenous vegetables to food security and nutrition across selected communities in South Africa. They pointed out the significance of indigenous vegetables on the nutritional status of people. In the result, vegetables were reported to be high in micronutrients and although consumed in small quantities, play a central role in household food security for poorer rural groups. However, the

issue of marketing and profitability of vegetables to farmers within the country has been scantly researched.

Many smallholder farmers can benefit from agricultural markets. Markelova *et al.* (2009) conducted a study on the challenges and constrains faced by smallholder famers on market participation. However, the study did not cover the issue of farm profits obtained from participating in markets. It only focused on identifying barriers and innovations to alleviating constraints and challenges. Another study conducted by Maponya *et al.* (2015) examined determinants of participation in agricultural markets in the Eastern Cape of South Africa. Descriptive analysis and univariate regression analysis were used in the study.

Despite the numerous policies and repetitive studies regarding vegetables and their significance to human life, the study of vegetables in relation to marketing and profitability in South Africa has not been properly researched into. It is, therefore, imperative to examine the effect of enterprise development support programme on market participation and profitability of indigenous vegetable farmers in South Africa.

1.1 Problem statement

In South Africa, a lot of farmers have missed opportunities in using vegetables due to their reliance on other crops such as cereals and other cash crops for survival. As such, their participation in the market is very low as far as the commercialisation of vegetables is concerned.

Different researchers have listed various factors that limit farmers' production and marketing of vegetables. Authors such as Okoruwa *et al.* (2009) identified farm size, access to credit facility, transportation costs, and contact with extension agents as factors that affect market participation among farmers. Randela *et al.* (2008) reported age, literacy level, ability to speak English, ownership of transport, access to market information, distance to market, dependency ratio and land size to have an influence in market participation. This has since resulted in a few farmers producing vegetables. However, those who do produce them, do so on a very small scale due to fears of loss of produce and association with various factors as invested inputs.

Smallholder farmers in South Africa remain poor despite substantial investments by the government. Smallholder farmers face numerous constraints, which increase risks and uncertainty and act as disincentives for increased production, consequently preventing them from accessing markets (Senyolo *et al.*, 2009). According to Sikwela and Mushunye (2013); Poulton *et al.* (2005), even though farmers possess some competitive advantages over larger producers, they face a danger of being squeezed out of the marketing system. However, over

the last two decades, Structural Adjustment Programmes have led to a decline in state-funded agriculture support, with the result that many famers find it difficult to access inputs as well as, extension and training in South Africa.

Various researchers have identified many constraints that limit farmers' participation in high value markets. These constraints constitute the greatest barrier of smallholder farmers when it comes to accessing high value markets and overcoming them is important if farmers have to access and benefit from these lucrative markets (Vink and Kirsten 2000). Due to poor production, which is characterised by high production costs and poor quality, smallholder farmers in sub-Saharan Africa (SSA), and South Africa, are excluded from these lucrative markets. Agriculture is the main source of employment and income in many areas and plays an important role in enhancing productivity of smallholder farmers. The aim of this study is, therefore, to analyse how enterprise development support affects marketing and profitability of indigenous vegetable farmers in South Africa.

1.1.1 Research questions

To achieve the objectives of this study, the main research question asked was: what is the effect of enterprise development support programme on indigenous vegetable farmers' market participation and profitability?

The subsidiary questions asked were:

i) What are the socio-economic characteristics of smallholder indigenous vegetable farmers in South Africa?

ii) What are the effects of enterprise development support programmes on the market participation of smallholder indigenous vegetable farmers

iii) What are the effects of enterprise development support programmes on the profitability of smallholder indigenous vegetable farmers?

1.2 Objectives of the study

1.2.1 General objective of the study

The general objective of the study was to investigate the effect of enterprise development support programmes on market participation and profitability of indigenous vegetable farmers in South Africa.

1.2.2 Specific objectives of the study

In order to achieve the aforementioned general objective of the study, the specific objectives were identified and specified. The specific objectives were to:

i) Describe the socio-economic characteristics of smallholder indigenous vegetable farmers in South Africa;
ii) Evaluate the effect of enterprise development support programmes on market participation of smallholder indigenous vegetable farmers
iii) Analyse the effect of enterprise development support programmes on the profit inefficiency of smallholder indigenous vegetable farmers

1.2.3 Hypothesis

- Enterprise Development Programme does not affect market participation of smallholder indigenous vegetable farmers
- Profitability of smallholder indigenous vegetable farmers is not affected by Enterprise Development Programme

1.3 Rationale for the study

Production and utilisation of vegetables can make a much-needed contribution to better nutrition and income in many African countries (Mmbengwa *et al.*, 2013). The South African agriculture and agro food landscape is changing in line with changes occurring internationally as a result of market liberalisation and globalisation. It is the view of the researcher of this study that the food basket of South African households is fast growing towards high-value food commodities such as indigenous vegetables (Mkhabela, 2007). The aim of this study is to examine the challenges and opportunities of smallholder farmers in market-oriented production of high-value commodities and identify policy requirements as well as enabling institutional factors for their participation. The study will add to existing literature, and serve as a guide for future research relative to marketing. The study will also assist in the development of specific agronomic policies to suit marketing of horticultural crops with more emphasis on indigenous vegetables. The study will also promote the use and marketing of African indigenous vegetables as opposed to GMOs which possess a lot of health hazards. Furthermore, the study will benefit and assist smallholder vegetable farmers to better participate in marketing their

products and also to make profit from their sales. Finally, the study will help improve the commercialisation of African indigenous vegetables in South Africa.

1.5 Outline of the study

This study is divided into five chapters. Chapter 1 is the background and general orientation of the study. Chapter 2 focuses on the literature review. The literature review focuses on smallholder farmers in South Africa, indigenous vegetable production and market participation. Support programmes and their components in South Africa are also examined in this chapter. Chapter 3 focuses on the study area, research design and methodology used in conducting this study.

Chapter 4 is a presentation of the empirical results of the study and how the research questions were addressed. Chapter 5 is the summary of findings, conclusions and policy implications.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter provides an overview of previous research on market participation and profitability of African indigenous vegetables. The principal aim is to review socioeconomic and demographic factors that influence market participation and profitability of African indigenous vegetables.

2.1 Market participation of African leafy vegetables farmers

South Africa produces different types of vegetables in different agro-ecological zones as sources of income and food security. The South African government has been encouraging farmers to engage in vegetable production through the National Agricultural Marketing Council (MOA, 1998). This has been one of the efforts by government to encourage farmers to diversify crop production activities on farms. The country is blessed with fertile soils, hence the government emphasising on more production to cater for an increase in population size. Climatic conditions and supply of water in the country are favourable although there is still a need for additional developments in terms of modern technologies (SAAPS, 2015).

Famers rely on infrastructure, technology, communication links and transportation to market their products efficiently in South Africa (Khapayi and Celliers, 2016). This makes marketing a fundamental factor in the success of vegetable farming. Market participation becomes more profitable if farmers are able to minimise transaction costs and produce goods and services at a lower cost (Masuku and Xaba, 2013). The choice of marketing outlets depends, among other things, on agro-ecological location of the channels and whether the farmer is able to meet market requirements successfully or not. Farmers can sell their products through different marketing channels ranging from farm gates, local supermarkets and or fresh produce markets available in the area. Market participation is a cause and consequence of economic development since markets provide households with opportunities to specialise according to comparative advantage, thus enjoying welfare gains from trade (Boughton *et al.*, 2007).

Infrastructure plays an important role in market participation as it enables the movement of agricultural produce from the farm to the market. Underdeveloped infrastructure, non-existence of market space prevents farmers from participating in markets. Most smallholder farmers in South Africa are found in remote areas where there are serious problems of roads, networks

and market places (Machethe and Mollel 2000). Transportation and transaction costs will increase due to lack of proper/enabling infrastructure. Farmers rely mostly on public transport, which in most cases, does not cater for proper handling and transportation of perishable food items (Sikwela and Mushunye, 2013). It is further revealed that lack of communication network is a result of poor infrastructure as it limits marketing participation by smallholder farmers. Likewise, Chaminuka (2006) points out that growth of smallholder farmers is constrained by poor infrastructure and excessive transaction costs.

Technology is central to transformation of farming systems and enables a transition out of poverty. Morden agricultural inputs enable resource poor farmers to produce surpluses of marketable quality farm products. The need to promote smallholder market participation is an important effort necessary to ensure agricultural transformation. This is in agreement with Yasar *et al.* (2016) who maintain that commercialisation is the result of simultaneous decision-making behaviour of farm households in production and marketing. This can be attained through substantial diffusion of modern agricultural technologies. Likewise, Awotide *et al.* (2013) recommend that government should improve programmes that introduce farmers to the latest technologies in order to increase market participation and generate improvement in the welfare of households. However, Rajendran *et al.* (2015) argue that output growth is determined by the efficient use of available technologies as opposed to availability of technological innovations only.

Technology itself is not sufficient. Access to agricultural markets and agricultural market information is essential for participating in agricultural markets. Communication channels must exist through which the voices of farmers can be heard so that they can share experience, generate knowledge, enhance the economic viability of their farms by increasing access to information pertaining to markets, weather and climate; and participate in decision-making around issues that affect marketing and farming in general. There is an uprising communication occurrence across and liberalization of the communications sector in many countries has allowed cellular phone companies and FM radio stations to enter rural areas. Previously under-developed and excluded villages now have opportunities to access markets and market information with the help of mobile telephony and the FM radio stations (Mukhebi, 2007). Modern ICTs now offer unprecedented potential to deliver information to poor rural communities and link them to remunerative markets, and thus contribute to alleviating food insecurity, poverty and transforming social and economic conditions.

Smallholder farmers lack capital to commence their farming projects. Lack of expensive inputs like seeds, chemicals, fertiliser, labour and machinery limit farmers from being productive. If farmers are to produce for high value markets, production resources such as land, labour and capital, which in most cases are not readily available for smallholder farmers, should be made available (Delgado, 1999). The need for collateral security when farmers have to borrow money from creditors also discourages farmers from participating in markets. The poor state of the farmers also limits them from laying their hands on important avenues that can assist them in improving productivity and, in turn, increase income and profits.

Farmers' organisations assist in sharing information and collective production responsibilities. Cooperatives have inherent advantages in tackling issues of poverty, food insecurity and unemployment. It also has an immense potential to deliver goods and services in areas where both the public and private sectors have failed (Bijman *et al.*, 2012). Cooperatives are considered as an organised formations that can assist smallholder farmers to improve access to markets and increase their incomes. According to the Department of Agriculture, Forestry and Fisheries (2012), grouping of smallholder farmers into cooperatives and producers organisations can overcome barriers to access to markets and develop innovative organisational arrangements that broaden their capabilities and enable them to benefit from an array of available services.

Efficient transport networks are considered essential for market competiveness. Transport infrastructure investment reduces the costs of doing business over distance and thus improve the capacity of the farm to compete in the markets. Market competiveness is a matter of delivering produce to the markets more cheaply and quicker than other producers. According to Arethu and Bhatta (2012), improved transport promotes social and economic development by improving physical access to both resources and markets. He goes ahead by saying that marginal costs decreases as a result of improved transportation. Road transportation can reduce production costs by lowering prices of delivered inputs and in turn positively affect profits made by farmers although the extent to which this happens depends on the competitiveness of the transport service market

2.2 Profitability of African vegetable production on farmers

Profitability is considered at the level of the individual farm with the main indicators as price, income, gross margin and net income. It is particularly dependent on sale price per unit and on production cost. It is also dependent on various factors such as the degree of fairness between producers and buyers, availability of markets that are willing to pay for the produce as well as the quality of products sold (Ton, 2013). Production of African indigenous vegetables has the potential to create economic growth by generating job opportunities, adding value and bringing products closer to consumers. However, Weinberger and Msuya (2004) state that in as much as there is an increase in demand for indigenous vegetables, their production is met with low profitability due to incidents of pests and diseases as well as the absence of efficiency.

2.3 Enterprise development and market participation among farmers

In South Africa, like in many African countries, smallholder farmers are the drivers of economies even though their potentials are often underexplored. In an attempt to reduce poverty, government has identified development of different enterprises among farmers for their empowerment. Enterprise development is the key strategy for increasing economic opportunities for farmers and as a way of enabling them to participate in national building. The realisation that not all farmers have an interest in entrepreneurship, the government has broadened its focus to include the facilitation of market participation, supply of inputs, extension services and enabling market requirements. Enterprise development also provides other services such as training, mentoring and developing partnership with private and public institutions.

The success of an enterprise development and market participation can be dependent on various factors. According to Osmani and Hossain (2015), farming experience plays an important role in market participation since it is associated with skills acquired over a period of time. Boughton *et al.* (2007) argue that farming experience has a negative relationship with market participation. This is because experience comes with a number of years in farming and farmers who have stayed longer in the farming industry, are less likely to participate efficiently in markets. This is because they lack marketing strategies, production skills and bargaining power. However, Jagwe *et al.* (2010) posit that factors related to farming experience are likely to affect the likelihood and intensity of smallholders' participation in markets. It is, therefore,

important to explore the relationship between farming experience and market participation among African indigenous vegetable farmers in South Africa.

Farmers with large land holdings tend to allocate their land to different agricultural enterprises for diversification while those with smallholding aim at producing crops that yield high and quick returns. This is contrary to the view of Montshwe *et al.* (2006) who argue that large land size implies large production scales and vice versa. Therefore, farm size can be related to market participation, and considered in this study as one of the most critical variables.

Market participation should be encouraged and enhanced to increase a marketable surplus. Alene *et al.* (2008) argue that distance to the market directly affects market participation. The longer the distance, the less the frequency of market participation by farmers. Several other authors such as Barret *et al.* (2006) and Shiferaw *et al,* (2009) have also reported the same results. Farmers who have to travel long distances to reach markets, often end up opting to sell their products at farm gates in order to avoid transaction and transportation costs. Golleti (2005) conducted a study on agricultural commercialisation value chains and poverty reduction and found that farmers who reach markets easily, are more likely to participate better than those who do not. Long distances to markets do not only attract high transportation and transaction costs, but hamper the quality of vegetables as they are highly perishable and require specialised handling to enhance quality. Lack of these, can decrease both quality and quantity and deny farmers entry into high-value markets, thus leaving them as price takers.

According to Kabunga *et al.* (2014), production of vegetables is associated with women since they are responsible for taking care of the food safety and nutritional aspects of the food basket of families. Due to the fragile nature of women, vegetable production is believed to be a project reserved for women while men deal with crops that require extensive production methods and livestock. This is in agreement with Masusku *et al.* (2002) who also reported production and marketing of vegetables to be highly associated with females. On the contrary, Ndwandwe (2013) maintains that due to transformation of agricultural production, horticultural crops are not gender-based as it used to be. Male farmers are now participating more in vegetable production. This has worked to the advantage of some farmers as they have to travel long distances to market their produce, while their female counterparts stay at home to continue farming and taking care of the household.

Age of farmers on the other hand, plays an important role in market participation. Some researchers have reported that the older the farmers, the less likely they are to participate in the marketing of vegetables. The same results were reported by Arega and Manyong (2007) and Adepoju (2015) who explained that market participation declines with age because older farmers view farming as a way of life rather than business and are reluctant to adopt new technologies. Nonetheless, Omiti *et al.* (2009) postulate that age is associated with maturity and wisdom. The older the farmers, the more responsible they are in enhancing income in order to sustain their livelihoods, families and farming projects. Kiriki and Tisdell (2003) obtained similar results and found that the older the farmers, the higher their participation in markets. The aim of this study is thus, to investigate the relationship between age of famer and market participation in the South African contex.

According to Kiriki and Tisdell (2003), marital status plays an important role in influencing the success of rural entrepreneurship and market participation. Farmers, who are married, participate more in markets in order to support their families. Similar results were reported by Omonona *et al.* (2010). Nonetheless, Lapar *et al.* (2003) obtained different results, showing a negative relationship between marital status and market participation. It is, therefore, imperative to establish the relationship between marital status and market participation of African indigenous vegetables in South Africa.

The provision of efficient market information can have positive benefits for farmers. Nakasone (2013) argues that farmers who do not receive information on prices and markets at large, tend to participate less in the markets and sell at farm gates. However, Sikwela and Mushunye (2013) found a positive and significant relationship between market information and participation in markets. Receivers of market information are likely to sell more vegetables than non-receivers. Additional visits by extension agents increase the probability that the farmer will participate more in markets. Several authors such as Makhura (2001); and Montshwe *et al.* (2005) have reported the same results. However, a negative relationship between extension services and market participation was reported by Elias *et al.* (2013).

2.4 Enterprise development farm support and profitability

Contributions in terms of enterprise development consist of both monetary and non-monetary contributions that can either be recovering or not. This is aimed at improving development, sustainability and ultimately, financial and operational independence of beneficiaries. The

success of an enterprise development and profitability can be dependent on various factors. As mentioned by Khapayi, (2016), farming experience plays an important role in determining profitability among smallholder farmers. Khapayi, (2016) argue that farming experience has a positive relationship with profitability and efficiency. Farmers with more years of farming experience are strategic when marketing their products and fetch high income as opposed to famers with fewer years of experience. However, Jagwe *et al.* (2010) state that factors related to farming experience are likely to affect the likelihood and intensity of participation by smallholders in product marketing. This will adversely affect their profitability. It is, therefore, important to explore the relationship between farm experience and farmers' profitability among African indigenous vegetables in South Africa.

The size of the farm determines the possible output that the farmer can expect. Large farms were reported by Paulson (2011) to have a potential of allowing for diversification of products against weather risks that are likely to affect yields. Large farm size can also be a bargaining tool for the famer as it provides them with the opportunity to buy inputs in bulk and at a lesser price, which is likely to give higher returns. Hoshide *et al.* (2011) hold a contrary view and believe farm size could pose some serious challenges. The amount of time required to work on the farm increases as the scale of operations grows. This also increases the amount of time spent making decisions regarding operations on the farm, and this can negatively affect the profitability of farms.

The willingness by smallholder farmers to adopt productivity-enhancing technology and sell produce in good markets is based on the state of infrastructure and market conditions with which they are faced (Kiprono and Matsumoto 2014). Thus, by improving rural connectivity through the rehabilitation of roads, it is expected that the propensity of adopting productivity-enhancing technology and the intensification of fertilizer are bound to increase. This is in line with the findings of other authors (World Bank, 2007) who also reported a positive and significant relationship between distance to markets and profitability.

According to Donald and Sutherland (2002), women are responsible for selling and marketing of vegetables. Women are the traditional producers and marketers of horticultural crops throughout sub-Saharan Africa. However, compared to men, women face a number of challenges. Evidence suggests that women tend to lose income and control as a product moves from the farm to the market. Women farmers can find it hard to maintain a profitable market

niche. However, some scholars have a contrary view and believe vegetable production is still highly associated with women in most parts of sub-Saharan African countries. This is because they understand vegetable farming better than their male counterparts and also market them better for good profit margins (Masuku and Xaba, 2013; Parveen *et al.*, 2013).

The age of a farmer plays a crucial part in the production of vegetables. While some famers have observed that young farmers tend to perform better in production and marketing of vegetables, some have a contrary view. Olujenyo (2009) argues that older farmers have more experience and perform better than their counterparts in the marketing arena. The same results were reported by Mumba *et al.* (2012) who found that an increase in the age of a farmer leads to an increase in profitability of a smallholder. From the results obtained by Mumba *et al.* (2012), marital status had no significant effect on profitability of smallholder farmers. Although in most cases, farmers who deal with production and marketing of vegetables are married, marital status has no effect on the profitability of smallholder vegetable farmers. These results are in line with the study conducted by Tabitha and Tisdell (2012) and Chidi *et al.* (2015).

Market information also plays a crucial role in the profitability of smallholder farmers. Kelsey (2013) argues that although information about how and where to sell is important to farmers, its success solely relies on how such information is presented. This implies who provides the information, how much information is given, and in what form. These issues can be as important as the contents of the information itself. The author further maintains that lack of information may present a barrier on both demand and supply side, which is likely to contribute to inefficiency in input and output markets. Dethier and Effenberger (2012) recorded the same observations. For farmers to make well-informed decisions in terms of accessing markets, information is very essential. Lack of such information exposes farmers to some disadvantages (Montshwe *et al.*, 2006). Farmers may also rely on informal networks (friends, relatives) for information due to lack of strong public information systems (Francois *et al.*, 2005). Smallholder farmers normally accept low prices for their produce when informed about the quality of their produce. This leaves farmers as price takers since they lack strong bargaining and negotiation skills (Mangisoni, 2006) especially the older farmers.

Extension programmes have a positive impact on farm profitability. Visits by extension agents provide an opportunity for transfer of innovative skills, knowledge and information, which could facilitate the adoption of new production techniques and lead to an increase in marketing and profitability. Similarly, Evenson and Mwabu (2001) reported the same results. However, the author cited some limitations of extension services. In as much as such services can be very useful to farmers, they may become more complex with increased visits. Initial messages are aimed at improving basic production techniques after which the attention shifts to more complex messages relating to fertilizer use and pest control measures.

The importance of improving rural infrastructure, and in particular rural roads, has been over emphasised in different studies. An investment in rural infrastructure is, therefore, considered to have important positive effects on agricultural production and trade. According to Khapayi and Celliers (2016), improved roads have the ability to transport farm produce provided opportunities for farmers with skills to invest in farming and markets are present. A positive relationship between road conditions and profit was reported by the author. Only farmers who had good road conditions were able to access good markets and deliver their produce timely and retaining good quality. Similar results were reported by Oraboune (2008), showing an increase in road investments, thus leading to a decrease in poverty. Dercon *et al.* (2006) found that road density is one of the significant determinants of household level prospects of escaping poverty by increasing incomes from farm produce marketing.

2.5 Theoretical framework

2.5.1 Market participation theory

i. Ansoff Matrix

The model was developed in 1965 by H. Igor Ansoff in his book entitled Corporate Strategy. The main axes of the matrix are new or existing products, new product development, market development and diversification. New or existing markets have four quadrants: market penetration; existing products; markets; and new product development (which involves new products introduced into existing markets). Market development involves finding new markets for existing products. Diversification involves new products in new markets. Each of these growth options draws on both internal and external influence, investigations and analysis that are then worked into alternative strategies.

ii. Market penetration

The marketing planning model helps the business determine its product and market strategy. Here, current products are supplied into the existing market and a potential for growth exists in the increased market share by selling more products to customers or finding more customers in the existing market. In the study, farmers can use existing markets to show case the potential of their products and enjoy the benefits of participating in markets profitably. It is often regarded as the right strategy because businesses focus on markets and products they are familiar with only and can easily exploit insights on what customers want. There is unlikely no need for new product development nor new market research. If the market is not growing fast enough for the business to achieve its growth objectives, then a need for product development is often realised.

iii. Product development

It is associated with the development of a new product to enter into the existing market. Market share can be increased by selling new products to existing customers related to or familiar to those existing on the market to broaden their selection options. It is the natural ally of market penetration. If one can sell existing products to existing customers and also keep customers happy by offering new variations and new experiences, it can significantly add to increased revenue and profits. A strategy often plays to the strengths of an established business and puts strong emphasis on effective market research (insight into customer needs) and successful innovation. A great way of exploiting the existing customer base is by being first to the market to gain first movement advantage before your competitors can copy your idea and reach your customers first. In this particular study, farmers can increase their market share by developing new products and target their existing client base.

iv. Market development

This is a growth strategy where the business seeks to sell its existing products into new markets, new customers and new geographical markets (e.g. exporting to emerging markets). Here, new distribution channels can be used and different pricing policies adopted to attract new customers in different market segments. This marketing approach can best be suitable where existing markets are saturated, mature or growing slowly or just as a systematic strategy to enter into faster growing markets. The approach is, however, riskier, particularly expansion into international markets as the products may not be suitable for new markets based on the

needs of customers. The strategy is also riskier as its success is solely dependent on consumers, therefore, it might not be suitable for most smallholder vegetable farmers as yet.

v. Diversification

It is an inherently risky strategy since there is often little scope for using existing expertise. There is little or no direct experience of the product or market with initial few economies of scale. However, if successful, overall risk of the business is spread. This means that should one business suffer from adverse circumstances, another may not be affected. One of the best approaches would be to develop new solutions, acquire on existing business in the market and extend the existing brand into the new market. For smallholder vegetable farmers in this particular study, diversification would mean the introduction of different vegetable species into the market in order to provide options for customers. The success of the approach will also depend on customers' willingness to try and pay for new products. A risk analysis can assist in gaining an understanding of the dangers associated option from the above-mentioned marketing strategies. To identify dangers that might be faced by the farmer, a contingency plan can then be created after which the best option can be selected and implemented.

2.5.2 Profitability theory in vegetable production

The Cobb-Douglas function can be adopted to measure the profitability of African indigenous vegetable farmers. Cobb-Douglas is widely used to represent the relationship of an output to inputs. It was proposed by Knut Wicksell (1851-1926) to test against statistical evidence by Charles Cobb and Paul Douglas in 1928.

The model can be specified as follows: $YY = AL^{\alpha}K^{\beta}$

Where Y = total production (monetary value of all goods)

L = labour input

K = capital input

A= total factor productivity

β&α are output elasticities of labour and capital respectively. The values are constant further if

$\alpha+\beta = 1$, returns to scale are constant. $\alpha+\beta <1$, returns to scale are decreasing, $\alpha+\beta >1$, returns to scale are increasing.

if farmers utilise their land effectively, they would improve their profitability levels. Lastly, membership in a cooperative inversely affects profitability of famers. This implies that membership in a cooperative does not fully influence profitability. Possible reasons can be that farmers who are members, produce only to secure markets as a collective and shift focus of growing their individual enterprises. The results of the study on cooperative membership are contrary to what has been reported by other researchers.

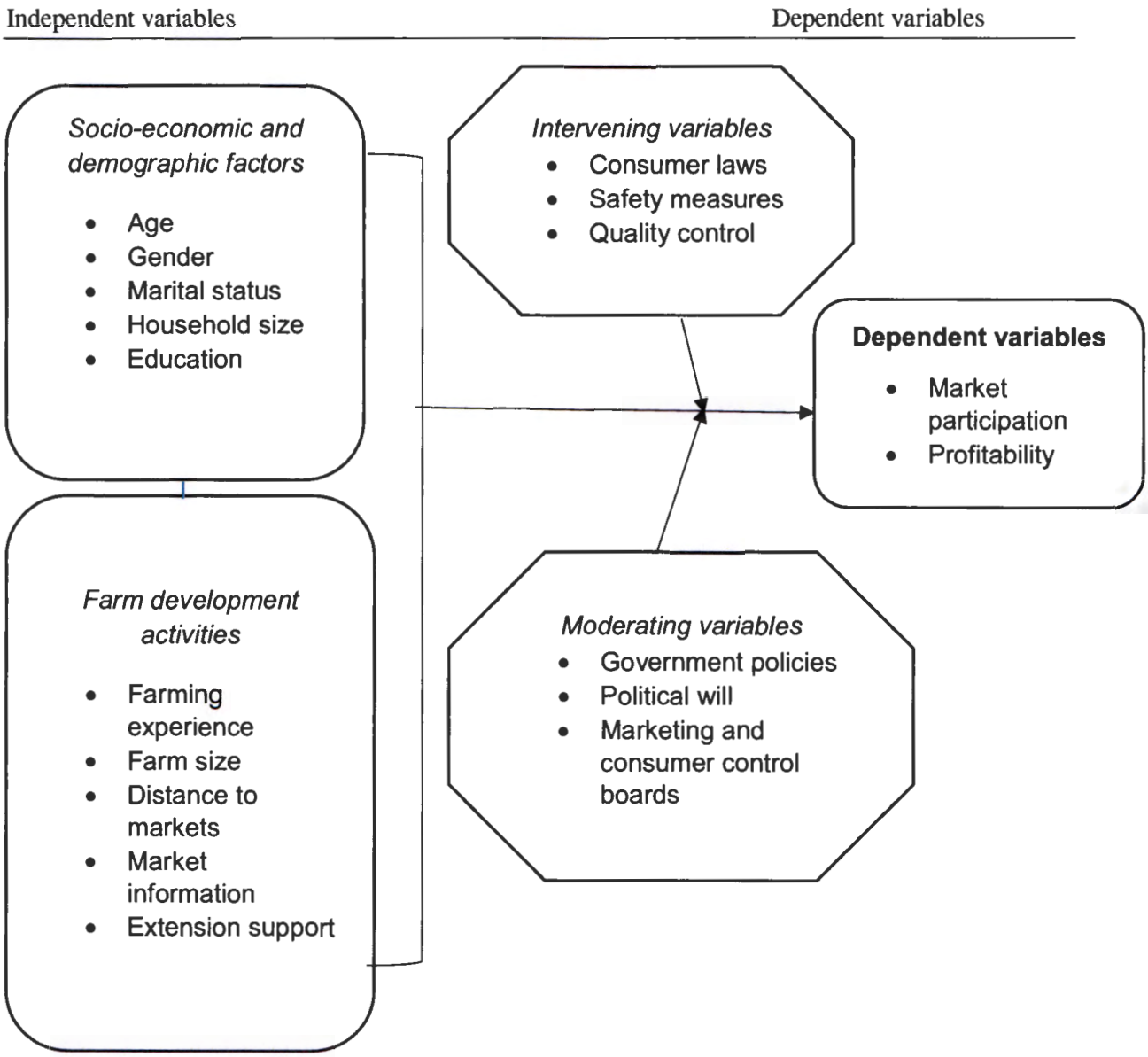

Figure 2.1: Conceptual framework

***Source*:** Authors concept

The above framework illustrates the interrelationships in the study, the interrelationship between key variables. Socioeconomic characteristics are the background factors (age, gender, marital status, household size and education) and are believed to have an impact (direct and indirect) on both market participation and profitability of African indigenous vegetable farmers. However, intervention factors are external factors put in place to prevent/ alter a result or case of events. In the figure above, factors such as consumer laws and quality control are considered to protect both the farmer and the consumer and create a stable environment as one consumes and the other trades. Enterprise development activities such as farm size and extension services also have a direct impact on both market participation and profitability. To caution the process, moderating factors to make the processes less extreme such as government policies and political environment are put into place by responsible institutions.

2.7 Summary of chapter

General market participation and profitability of African indigenous vegetables farmers in South Africa have been examined in this chapter. The key highlights considered in the literature are that smallholder farmers are faced with challenges that limit their participation in markets. The literature reviewed revealed that the challenges of smallholder farmers stem from limited factors such as infrastructure, experience, farm size and quantity. It further revealed that production of African indigenous vegetables has a potential to create economic growth. Lastly, the literature review also revealed the relationship between enterprise development, market participation and profitability of farmers. In order for farmers to improve participation in the markets and make profit, there is a need for capacitation in terms of market participation among farmers.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in conducting this study. The study area, research design, sampling and data collection methods, analytical techniques, variables of measurement and limitations of the study are also described and discussed in this chapter.

3.2 Study area

The study was conducted in Limpopo, Mpumalanga, Eastern Cape and KwaZulu-Natal provinces of South Africa. These provinces are involved in projects that support the promotion and cultivation of commercial African leafy vegetables. South Africa is divided into a number of regions according to climate, natural vegetation, soil type and farming practices. Agricultural activities range from intensive crop production and mixed farming in winter rainfall and high summer rainfall areas to cattle ranching in the bushveld and sheep farming in more arid regions Thomas *et al.* (2007). The map below shows the areas where data was collected for the study. The Limpopo province is the country's' breadbasket and one of South Arica's most important agricultural regions as a significant producer of livestock, fruit and vegetables. The agricultural sector in the province is faced with numerous constrains particularly frequent droughts, poor soil fertility and high ambient temperatures. The sector is also constrained by high costs of production inputs, seed, fertiliser and chemicals as well as lack of funding and commercial farming skills (Molele, 2016). Agriculture in Mpumalanga is characterised by a combination of commercialised farming, subsistence and livestock farming, and emerging crop farming. Crops such as subtropical fruits, nuts, citrus, cotton, tobacco, wheat, vegetables, potatoes, sunflowers and maize are produced in the region. The Eastern Cape is characterised by fertile soils focusing mainly on deciduous fruit orchards while Kwazulu-Natal is the best watered province with larger area of high quality agricultural land than any other province. The agricultural sector is mainly focused on crops, horticulture, forestry and animal husbandry. The map below shows the areas where data was collected for the study

Figure 3.1: Map of South Africa

Source: www.saexplorer.co.za/south-africa/map/south_africa_map.asp

3.2 Research design

A cross-sectional research design was adopted in the study. According to Levin (2006), cross-sectional research refers to a study which collects data of the designated study respondents in a once off manner and based on the information collected, analysis is derived. That is to say, as a cross-sectional study, a snapshot of factors related to vegetables market participation and profitability in the area of study were collected, primarily from respondents. In addition, other factors associated with farmers in the study area such as socioeconomic and demographic factors were collected. It is imperative to note that in a cross-sectional study, once the information is collected and articulated very well, it acts as a good basis to represent the findings of the study to the entire population in question (Levin, 2006).

3.3 Sample and sampling frame

The study population was drawn from farmers involved in the business of vegetable production and involved in the marketing of African leafy indigenous vegetable in South Africa, namely Amaranth, Spinach and Mustard. Overall, 86 farmers were interviewed for the study and

included both ARC beneficiaries and non-ARC beneficiaries. There are 41 farmers in the records of the Agricultural Research Council and their database was used to access smallholder vegetable farmers producing indigenous vegetables in different provinces. Research Technicians from ARC were used as the initial contact persons when visiting smallholder vegetable farmers to be interviewed. An additional sample of 45 indigenous vegetable growing farmers (not ARC project beneficiaries) were included in the study. Extension officers from the Department of Agriculture were used to identify the same number of farmers as ARCs in the provinces mentioned above. Purposive sampling was used involving all farmers in the study as primary sources of data due to their limited number.

3.4 Data collection

Primary data was used to achieve the objectives of this study. A structured questionnaire was used to collect data for the study. The questionnaire had both closed and open-ended questions. According to Levin (2006) and Bishop and Zieger (1990), the use of open-ended questions provides an impetus for the study respondents to freely explain their views on the aspect concerned. Thus, assisting in explaining some issues that are not properly captured in close-ended questions that were pre-set to provide suggested outcomes from respondents. A total of 86 smallholder indigenous leafy vegetable farmers were interviewed. The questionnaire included requested information on demographic and household characteristics of respondents such as age, gender, education and marital status, farm specific characteristics, remittances, form of assistance as well as challenges faced by smallholder indigenous vegetable farmers in marketing their products. The questionnaire was administered through personal interviews. Experts in the Department of Agricultural Economics and Management (North-West University), as well as the Economics Division of the Agricultural Research Council (ARC) in order to establish content and validity, as well as to review the developed questionnaire.

3.5 Analytical strategy

Three approaches were used during the analytical process in order to address the objectives of the study. The following sections provide the analytical processes used in the study.

3.5.1 Univariate analysis

Descriptive analysis was used in the study. This method of analysis allowed the presentation of data in the form of frequencies and percentages to give an account of the socio-economic and demographic characteristics of smallholder farmers engaged in the production of African indigenous vegetable farming in South Africa.

3.5.2.1 Econometric analysis

3.5.2.1 An analysis of market participation for African indigenous vegetable farmers

Probit models were introduced by Chester Bliss in 1934. It is a fast method for computing maximum likelihood estimates. It is a type of regression where the dependent variable can only take two values (Yes or No). Probit logistic regression was used to fit the estimate of market participation among vegetable producing farmers. The model estimates probability that an observation with certain characteristics will fall into a specific category. It is a popular specification for an ordinal model and, as such, treats the same set of problems as does the logistic regression using similar techniques.

The model can be specified as follows:

$$P_i^* = YZ_i + \mu_i \qquad (1)$$

which determines the value of participation by

$$P_i = \begin{cases} 1 \; if \; P_i^* > 0 \\ 0 \; if \; P_i^* \leq 0 \end{cases} \qquad (2)$$

Where P_i^* = latent continuous index measuring participation for the ith farmer

$Z_i =$ a vector of factors which affect participation (vegetable type, revenue, road condition, gender, cooperative membership, distance to markets, education, framing experience, market linkage and being ARC farmer) and

$\mu_i =$ is the random error term.

3.5.2.2 Profitability realised by farmers in participating in African indigenous vegetables small-scale business

The profit function below was used in the study to derive the profit realised by the farmers.

$$P(x) = R(x) - C(x) = 0 \quad (3)$$

where P = price

R = revenue

C= Cost of associated vegetable farming

In this case, $R(x) = P(x).K$ and

$$C(x) = FC(x) - VC\ (x) \quad (4)$$

where R = revenue

P = price

K = unit produced.

In this case, $VC(x) = \sum\ (x_1 + x_2 + x_3 \ldots\ldots\ldots\ldots x_u)$ (5)

where x_1 = seed

x_2 = inputs

x_3 = fertiliser

x_u = other variables (type of vegetable, distance to markets, road conditions, gender, Marital status, education, household size, farming experience, extension Support, market linkage).

Therefore, based on this derivation, a stochastic frontier profit inefficiency estimate of model was used to fit the profitability model. The study estimates translog profit function (equation 6) and inefficiency function (equation 7)

The specification of vegetable farm Trans log profit function model

$$\ln \pi' = \alpha_o + \propto_1 lnf_i + \propto_2 lnlb_i + \propto_3 lnS_i + \propto_4 lnt_i + \propto_5 lnld_i + \propto_6 lnlb_i^2 + \propto_7 lnld_i^2 + \propto_8 lnf_i^2 + \propto_9 lns_i^2 + \propto_{10} f_i * S_i + \propto_{10} lb_{i_i} * f_i + e_{i,} \quad (6)$$

Where:

In = Natural log

π' = Normalised profit

α_o = constant parameter

fi = fertiliser, lbi = labour, Si = seed, ti = transport, $lnlb_i^2$ = labour*labour, $lnld_i^2$ = land*land, lnf_i^2 = fertiliser*fertiliser, lnS_i^2 = Seed*seed, $f_i * S_i$ = fertiliser*seed, $lb_i * f_i$ = labour*fertiliser

$e_{i,}$ = Random variable

Where

$u = \delta o + \sum_{d=1}^{6} \delta o \, w_{d+\vartheta}$ .....(7)

3.5.3 Model testing

Model validation is important to guarantee models' goodness of fit. Measures of goodness of fit typically summarise the discrepancy between observed values and the values expected under model in question.

3.5.3.1 Post estimation

The following tests were used to test the models' fitness:

i. Maximum likelihood estimation

Maximum Likelihood Estimation (MLE) is a widely used method of estimating the parameters of a statistical model using the given data. The method selects the set of values of the model parameters that maximises the likelihood function and gives a unified approach to estimation (Scholz, 1985).

ii. Log likelihood

This is the log likelihood of the fitted model. It is used in the Likelihood Ratio Chi-Square test of whether all predictors' regression coefficients in the model are simultaneously zero and in tests of nested models. For a logistic regression model, the log likelihood value is always negative because the likelihood contribution from each observation is a probability between 0 and 1 (Nolan, 2001).

iii. Crag and Uler *R2*

This is McFadden's pseudo R-squared. A rule of thumb that was found to be quite helpful is that a McFadden's pseudo R-squared ranging from 0.2 to 0.4 indicates very good model fit. McFadden's R^2 can be as low as zero but can never equal one (Fraser, 1991).

iv. Akaike information criterion

The Akaike information criterion (AIC) is a measure of the relative quality of statistical models for a given set of data. Given a collection of models for the data, AIC estimates the quality of each model, relative to each of the other models. Hence, AIC provides a means for model selection. AIC is founded on the Information Theory: it offers a relative estimate of the information lost when a given model is used to represent the process that generates the data. In doing so, it deals with the trade-off between the goodness of fit of the model and the complexity of the model (Cavanaugh, 1997).

v. Multicollinearity test

Multicollinearity (also collinearity) is a phenomenon in which two or more predictor variables in a multiple regression model are highly correlated. A formal detection-tolerance or the variance inflation factor (VIF) for multicollinearity: A tolerance of less than 0.20 or 0.10 and/or a VIF of 5 or 10 and above, indicates a multicollinearity problem. Variance Inflation Factor was used to test multi-collinearity in which the variables were assumed not to be collinear if and only if the inflation factors were within the range of 1-10. To achieve an acceptable range of VIF, some variables were dropped to produce a model with significant coefficients (Graham, 2003).

The log likelihood which is used to test whether all predictors' regression coefficients in the model are simultaneously zero was tested for the models use. The likelihood value is always negative and from both models used in market participation and profitability, the likelihood was recorded at negative meaning the coefficients were simultaneously zero. The variance Inflation Factor was used and recorded less than 10 which proofed that there was no multicollinearity of variables.

3.6 Variable name, definition, measures and expected expectations

Table 3.1: Variables included in the models

VARIABLE	DEFINITION	DESCRIPTION	EXPECTED SIGN	LITERATURE REVIEWED
Market participation	Is the farmer participating in the informal market?	0 = Yes 1 = NO		
Profitability	Ability of the farmer to make profit			
OTHER				
Age	Age of the farmer	Years	±	Arega & Manyong (2004)
Gender	State of being male or female	0 = Male , 1 = Female	±	Kabunga *et al.* (2004)
Household size	Number of persons staying on the farm	Number	±	Seng (2016)
Level of education	Highest level of schooling	1=formal education 2=no formal education	±	Lapa (2002)
Farm size	Number of hectares used for vegetable production	Number	±	Montshwe *et al.* (2006), Paulson (2011)
ARC/Non-Arc	ARC project beneficiary or not	0 = Yes. 1 = No	±	
Support received	Assistance received for farming	0 = Yes 1 = No	±	Van Rooyen *et al.* (2008)
Sources of support	Who provided support?	0 = ARC 1 = Other	±	Sikwela (2013)
Support influence	Has support influenced marketing and profit?	0 = Yes 1 = No	±	Sikwela (2013)
Vegetable type	Type of vegetable grown and sold	1 = mustard, 2=spinach, 3=amaranth	+	
Road conditions	State of road used for reaching markets	0 = good 1 = Bad roads	±	Okanye et al. (2016)
Farming experience	Number of years of farming	Years	±	Osmani and Hassan (2015)
Cooperative member	Member of a cooperative or not	0 = Yes 1 = No	±	DAFF (2012)
Inputs used	Types of inputs used	Labour, seed, transport, land, fertiliser, land	+	Delgado (1999)

3.7 Ethical considerations

In an attempt to analyse the effects of enterprise development support programmes on market participation and profitability of smallholder indigenous vegetable farmers, data was collected from smallholder vegetable farmers (here referred to as respondents) through a structured questionnaire. Participation in the study was voluntary and respondents were free to withdraw from the study whenever they felt like doing so. The researcher sought the consent of respondents before allowing them to participate in the study. Their confidentiality was guaranteed. The researcher ensured that the questionnaire did not contain any degrading, discriminatory or any other unacceptable language that could offend any member of the sample group. The questionnaire was designed to collect information directly related to the research questions and no private or personal information from respondents. The aim of the study was clearly explained to respondents prior to the interview. Respondents were assured that they had the right not to respond to questions that made them feel uncomfortable and confidentiality was guaranteed.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.0 Introduction

In this chapter, the results are presented, interpreted and discussed based on the objectives of the study.

4.1 Socio-economic and demographic characteristics of vegetable farmers

The results of frequencies and percentages of farmers who participated in markets to trade their agricultural produce are presented. These farmers were divided into two categories as follows: farmers who received support from the Agricultural Research council (ARC) referred to in this study as ARC-farmers; and farmers who did not receive any support from the Agricultural Research Council (ARC) referred to in this study as non-ARC farmers.

Table 4.1: Socio-economic and demographic characteristics of vegetable farmers (Describe socio-economic characteristics of smallholder indigenous vegetable farmers in South Africa)

Variable	ARC		NON- ARC	
	Frequency	Percentage	Frequency	Percentage
	N= 41	%	N= 45	%
Gender				
Male	20	48.78	26	58
Female	21	51.22	19	42
Age				
10-20	1	2	11	24
21-40	16	39	17	38
41+	24	59	17	38
Marital status				
Married	36	88	31	69
Not married	5	12	14	31
Household size				
1-3	11	27	20	44
4-6	17	41	17	38
7+	13	32	8	18
Education				
Primary	12	29	5	11
Secondary	22	54	30	67
Tertiary	2	5	5	11
No formal education	5	12	5	11
Farm size				
0.5-5 ha	25	61	28	62
5-10 ha	5	12	7	16
10+	11	27	10	22
Distance to markets				
0-5 km	8	19	4	9
6-20 km	15	37	5	56
20-38 km	18	44	16	36
Road conditions				
Good	14	34	20	44
Bad	27	66	25	56

Source: Field survey, 2016

Table 4.1 above presents socio-economic factors for both ARC and non-ARC farmers. 51% of farmers supported by ARC are females while most non-ARC farmers are males. The same results were reported by Ozkan *et al.* (2000) who found that production of vegetables is associated with females. On the contrary, Mumbi *et al.* (2006) found that males are currently taking the lead in production and marketing of vegetables. This could probably due mainly to

the long distances that farmers have to travel to the markets to sell their agricultural produce. The results further revealed that 59% of farmers supported by ARC were 41 years or older. Farmers are reported to integrate the crops into their old age livelihood strategies for health and financial purposes. The age of the farmer as well as experience are believed to improve practices and exposure to agricultural markets (Ramoroka, 2012). In both categories, married (both male and female) farmers participated more in vegetable production than those who were not married. The results are in agreement with those reported by Baba *et al.* (2010) who found that married farmers participate more in vegetable farming in order to support their families. Household size plays an important role in farming as it can be an important source of family labour. About 41% of respondents who received support from the Agricultural Research Council (ARC) had a family size of 4-6 members; an indication that family labour is still a common practice among farmers in order to reduce the cost of hiring labour. Non-ARC farmers had household sizes of 1-3 members. In South Africa, the average household size is 3.4 members (Stats SA, 2010). More than half of ARC respondents (54%) have secondary education. Masuku and Xaba (2013) highlight the importance of education in farming and maintain it enables farmers to adopt change and innovation faster than the uneducated. An average of 62% from both ARC and non-ARC farmers had a farm size of three hectares while 25% had ten hectares and more. Land plays an important role in the production of vegetables as it grants farmers an opportunity to expand their farming enterprises. According to Mumbi *et al.* (2006), the bigger the size of the farm, the higher the yield and the better the chances of the farmer participating in the markets. The average number of years of farming experience is 8 years. Over 30% of ARC famers had substantial farming experience while non-ARC farmers had 15 years and more of farming experience. Farmers with adequate experience are reported by Osmani & Hossain, (2015) to participate in the markets better than those who do not have any farming experience.

4.2 Results of Probit regression

This section presents the results of the econometric models used to analyse informal market participation and profitability of African Indigenous Vegetable farmers.

Table 4.2 Probit regression estimate and marginal effect on determinants of informal market participation among indigenous vegetable farmers (Evaluate the effect of enterprise development support programmes on market participation of smallholder indigenous vegetable farmers)

		Probit regression		Marginal effect	
Informal market	**Parameter**	**Coefficient**	**P|z|**	**Coefficient**	**P|z|**
Vegetable type 1: mustard	β1	1.0760	0.136	3628837	**0.07***
Vegetable type 2: spinach	β2	3.6483	**0.005*****	0.7618	**0.000*****
Vegetable type 3: amaranth	β3	3.0860	0.038**	0.8008	0.000***
Market price	β4	-0.2142	0.13	-0.0835	0.125
Revenue	β5	-0.0002	0.027**	-0.0008	0.3
Distance to markets	β6	-0.0049	0.189	-0.0019	0.181
Condition of roads	β7	-2.4623	**0.003****	-0.7813	**0.000*****
Land use	β8	-0.8773	0.161	-0.3419	0.161
Gender	β9	-1.1476	**0.038****	-0.4213	0.19
Age	β10	-0.0087	0.697	-0.0034	0.696
Marital status	β11	-0.5947	0.283	-0.2205	0.246
Education	β12	0.4361	0.574	0.1609	0.541
Household size	β13	0.0487	0.571	0.0190	0.571
Membership of cooperative	β14	2.7590	**0.019****	0.8192	**0.000*****
Farming experience	β15	0.0341	0.124	0.0133	0.122
Extension support	β16	-0.1274	0.816	-0.0492	0.814
Market linkage	β17	-4.5535	**0.003*****	-0.9531	**0.000*****
ARC farmers	β18	2.8226	**0.013****	0.8290	**0.000*****
_cons		**1.9099**	**0.254**		
Number of observations	**86**				
LR chi 2(19)	**59,73**				
Prob> chi2	**0.000**				
Pseudo R2	**0.5108**				
Log likelihood	**-28.6034**				

Source: Field survey, 2016

Hint: ***p < 0.001; ** p < 0.05; * p < 0.1; CI = Confidence Interval

Table 4.4 above presents the results of the Probit regression model for participation in informal markets by farmers. The results show that revenue, condition of roads, gender and market linkage had a negative relationship with participation in the market while vegetable type 2 and 3 spinach and amaranths, membership of cooperative and being ARC farmers showed a positive relationship and statistical significance ($p<0.05$). Vegetable type 3 (amaranth) was statistically significant to participating in informal markets at 5% level while vegetable 2 (spinach) was statistically significant at 1% level. Thus, involvement of farmers in growing

spinach or amaranths increased the probability of participating in informal markets ($p<0.05$). However, the results of the marginal effect show that the three indigenous vegetables (mustard, spinach and amaranth) produced by farmers were statistically significant and had a positive relation to informal participation in markets. The results imply that a unit increase in each of the vegetables increases the probability of farmers' participation in informal markets. Increase in revenue will decrease the probability of participating in informal markets as farmers will produce more and target formal markets to sell their produce. This is in agreement with results reported by Moyo (2010), Montshwe *et al.* (2005) and Magingxa *et al.* (2005) that an increase in revenue increases participation in informal markets. Similarly, the condition of roads shows a statistical significance yet a negative relationship with participation in informal markets. According to Hlomendlini (2015), condition of roads influences participation in informal markets negatively. However, as the condition of the roads improves, participation will also be affected. The negative relationship could imply that even if the condition of the roads improves, due to low yields and substandard quality, farmers will not be able to improve participation in informal markets. Similarly, the results of the marginal effect on the condition of roads had a negative relationship yet showed a statistical significance. This implies that the probability of participating in informal market decreased by -0.781 as the condition of roads improved. The same results were reported by Ramoroka (2012) who pointed that the condition of roads is one of the fundamental factors that enables farmers to deliver their produce to the markets. The age of farmers showed a negative influence on participation in markets but was statistically significant at 5%. This implies that as a farmer grows older, the probability of participating in informal markets also decreases as they cannot travel long distances and turn to focus on activities that are less demanding. Arega and Manyong (2007) argue that participation in both formal and informal markets decreases with age because older people consider farming as a way of life rather than business and are reluctant to adopt new technologies in farming due to uncertainties of both the effects these new technologies will have. In this study, a positive and statistically significant relationship between membership of cooperative and market participation was found at 5% level of significance. Similarly, being an ARC farmer showed a positive relationship with participation in markets. This is in agreement with results obtained by Sikwela and Mushunye (2013) who found that farmers who receive support performed better in the agricultural food chain. The results of market linkage showed a statistical significance to participation in informal markets ($p<0.01$). As reported by Rios *et al.* (2009), farmers who are linked to the market participate better and tend to stay longer for better profits.

The results of membership of cooperatives were similar to those of indigenous vegetables and noted a coefficient parameter of 0.8192 (P<0.000).

4.3 Profitability

Generating profits and increasing profitability are the underlying concepts that influence the decisions of farmers. Various factors affect the level of profit and hence, determine the growth potential of farm business. This section provides an overview of some of the factors that influence profitability of vegetable farmers. Variables that are assumed to have an impact are then interacted to determine which combinations best influence profitability of farmers positively.

Table 4.3: Translog profit function on determinants of profits of indigenous vegetable farmers (Analyse the effect of enterprise development support programme on the profitability of smallholder indigenous vegetable farmers)

	Parameter	Coefficient	P|z|	[95%	Conf.
Log income					
Log fertilizer	*β1*	.5065765	0.221	-.3050489	1.318202
Log labor	*β2*	.2403793	0.333	-.2457891	.7265477
Log seed	*β3*	-.2985276	**0.069**	-.6204112	.0233559
Log transport	*β4*	.2771733	**0.001**	.1175209	.4368258
Log land	*β5*	-.0069876	**0.000**	-.0103408	-.0036343
Log labor*labor	*β7*	-.1424943	**0.009**	-.2497931	-.0351956
Log land*land	*β8*	-.0001865	0.612	-.0009064	.0005335
Log fertilizer*fertilizer	*β9*	-.0997815	**0.021**	-.1843299	-.015233
Log seed*seed	*β10*	.1717867	**0.000**	.0924892	.2510842
Log fertilizer*seed	*β11*	-.1114082	**0.007**	-.1930228	-.0297935
Log labor*fertilizer	*β12*	.1891201	**0.003**	.0629148	.3153254
_cons		4.522231	**0.000**	2.844452	6.20001
Number of obs	86				
Wald chi 2(13)	146.10				
Log likelihood	-114.93155				
Prob> chi2	0.000				

Hint: ***p < 0.001; ** p < 0.05; * p < 0.1; CI = Confidence Interval

Seeds are an important input factor and is a concern for both quality and quantity as this can influence the cost per output, which affects farming profit. From the Table above, the

coefficient for seed has a negative sign and is statistically significant at 10%. This implies that a unit increase in seed will result in a decrease in income as a result of a decrease in yields. Rachmina *et al.* (2014) maintain that an increase in seed seldom results in an increase in yields. Therefore, this has little or no effect at all on income. It is, therefore, evident that yield can only be increased to some extent by increasing the amount of seed during production. On the contrary, transport has a positive significant effect on profit which was noted by a parameter of 0.2772, ($P<0.01$). According to Mérel *et al.* (2006), high transport costs affect profit made by the farmers and vice versa. The results further showed that a unit increase in land decreased profit. The results implies that farmers tend not to adhere to the rates of seed application and either over spread or impose more than the recommended interspacing, which affects the quantity of yield harvested. The variables were further interacted to determine their impact on profit. Labour was doubled and showed a negative relationship to profit, yet it was statistically significant ($p<0.01$). This is dependent on the effectiveness of the labour engaged in the production process. The same results were reported by Feroz *et al.* (2009) who found that labour plays an important role in profitability. According to Sikwela and Mushunye (2013), most farmers make use of their household members as labour in order to increase production for profit. The results imply that vegetables need high labour for cultivation and the preparation of the land for good quality crops that can make entry into high value markets and fetch better prices. Doubling fertiliser also showed a statistical significance at 1% level even though the relationship to income was negative. The results imply that if the amount of fertiliser used in production is increased, yields will decrease and hence affect profit. On the contrary, other researchers (Pender and Gebremedhin, 2008; Murthy *et al.*, 2009; and Tilman *et al.*, 2002) found that an increase in fertiliser results in an increase in profitability. However, doubling seed showed a positive relationship and statistical significance with profit. If seed application is increased twice the initial application, profit will also be improved (Abu and Asember, 2011). An interaction of fertiliser with seed showed a negative relationship to profit. Although the results are statistically significant, the negative relationship implies that addition of these inputs will decrease profit. Moreover, a positive relationship exists between labour*fertiliser and profit at 1% statistical significance. The results imply that an increase in both labour and fertiliser will increase profit, however marginal return to scale must be observed.

Table 4.4: Analysis of profit inefficiency of profitability of indigenous vegetable farmers

	Parameter	Coefficient	P|z|	[95%	Conf.
Vtyp 1: mustard	*β1*	-28.91409	0.986	-3246.414	3188.585
Vtyp 2: spinach	*β2*	-2.013768	0.297	-5.796296	1.76876
Vtyp 3: amaranth	*β3*	4.458002	0.107	-.9656879	9.881692
Market price	*β4*	.3412082	0.158	-.1329746	.815391
Distance	*β5*	-.0988926	**0.024**	-.1846088	-.0131765
Road condition	*β6*	4.122046	**0.044**	.109334	8.134758
gender	*β7*	1.495443	0.193	-.7555125	3.746399
age	*β8*	.0486561	0.387	-.061485	.1587971
Marital status	*β9*	-1.37785	0.405	-4.61795	1.862249
Education	*β10*	-1.432988	0.487	-5.470397	2.604421
Household size	*β11*	.3318576	0.248	-.2310566	.8947719
Income	*β12*	.2661136	0.867	-2.855204	3.387432
Cooperative membership	*β13*	2.358589	0.108	-.5166361	5.233814
Farming experience	*B14*	-.0727185	0.182	-.1794658	.0340287
Extension support	*B15*	2.534668	0.177	-1.145015	6.214351
Market linkage support	*B16*	6.845036	**0.066**	-.46571	14.15578
ARC	*B17*	-4.718239	0.187	-11.72866	2.292181
_cons		-11.68467	0.055	-23.62724	.2579025
Number of obs	86				
Wald chi 2(13)	146.10				
Log likelihood	-114.93155				
Prob> chi2	0.000				

Hint: ***p < 0.001; ** p < 0.05; * p < 0.1; CI = Confidence Interval

From Table 4.6 above, distance to the market showed a negative effect to inefficiency and was noted by a coefficient parameter of -0.988 (P<0.024). Renkow *et al.* (2004) reported similar results. The objective of the condition of roads is to maintain and increase frequency to markets which is important in profit making. It is the major means of transporting agricultural produce from the farms to the markets. In this study, it is revealed that the condition of roads has a positive and significant effect on inefficiency of profit. Thus, an improvement in the condition of roads can increase the efficiency of farming profit. Ogunniyi (2011) also found that profit efficiency is affected by the condition roads. This result is also supported by research conducted by Rachmina *et al.* (2014). With the rapid transformation of marketing systems, traditional marketing channels are being replaced by coordinated links between farmers, processors and

retailers. The results of this study show that support on market linkage has a positive and statistical significance to profit inefficiency. Similar results were obtained by Morgan *et al.* (2009) who found that market linkage improves the efficiency of profit.

4.5 Summary of chapter

The purpose of this chapter was to present the data in a meaningful manner in order to draw conclusions and make recommendations to stakeholders. Based on the results obtained, several recommendations could be made on how farmers' participation in markets and profitability could be enhanced through supporting enterprise development.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The aim of this study was to examine the effects of enterprise development support programmes on participation in markets and profitability of indigenous vegetable farmers. This chapter provides a summary of the research findings, conclusions and recommendations. A quantitative approach was used in the empirical analysis based on the research questions outlined in the introductory chapter of the study. Policy implications and areas for further research are also provided in this chapter.

5.2 Summary

The aim of this study was to analyse the effects of enterprise development support programmes on participation in markets and profitability of indigenous vegetable farmers in South Africa. To answer the research questions in chapter 1, the first research objective was addressed by looking at the socio-economic characteristics of farmers, sources of support and their impact in different types of markets (formal and informal) as well as the impact of the support of participation in markets. The second research objective was addressed by employing the probit regression model in order to assess the main determinants of market participation as part of an integrated econometric framework. To address the third research objective, the Tran slog profit function model and stochastic frontier profit inefficiency estimates model were used to establish factors that influence profit and profit inefficiency.

The results of the first research objective showed socio-economic characteristics for both ARC and non-ARC farmers. Majority (51%) of ARC farmers were female while for non- ARC farmers, majority (88%) were male. 59% of ARC farmers were 41 years or more, while 38% of non-ARC farmers were 21-40 and 41 years and above. The results of household size showed that 41% of ARC farmers had 4-6 family members and 44% of non-ARC farmers had 1-3 family members. In both groups, 54% of ARC famers had secondary education compared to 67% of non-ARC farmers. Similarly, majority of farmers had land holdings of 0.5-5ha. 56% of ARC farmers travelled 20-38 km to reach markets while 56% of non-ARC farmers travelled 6-20 km for the same purpose. Lastly, 66% of ARC farmers reported bad road conditions while 56% of non-ARC farmers reported bad road conditions.

The results of the second research objective from the Probit regression revealed that a number of factors determined participation in informal markets. Spinach and amaranth showed a statistical significance of 1 and 5% respectively. They also showed a positive relationship with market participation, thus a unit increase in either spinach or amaranth increased the probability of the farmers' participation in informal markets. Revenue and the condition of roads showed a negative influence on participation in markets and were noted by a coefficient parameter of -0.00 ($P<0.027$) and -2.46 ($P<0.003$) respectively. Both variables were, however, statistically significant at 5%. A unit increase in gender decreased participation in markets and was noted by a coefficient parameter of -1.147 ($P<0.038$). Market linkage also recorded similar results and was noted at -4.55($P<0.003$). The results of membership of cooperative and ARC farmers showed a positive influence and a statistical significance of 1 and 5% respectively.

The third research objective investigated the effect of enterprise development support programmes on profitability of indigenous vegetable farmers. The results showed that there was significant improvement in profit made by farmers. The results also showed that seed and transport influence profit in a positive way and were statistically significant at 10% and 5% respectively. Land showed a 1% statistical significance and had a negative influence on profit. The variables were interacted to determine a combination that could influence farmers' profit. The results showed that interaction of land*labour, fertiliser*fertiliser and fertiliser*seed had a negative influence on profit and were statistically significant. The results imply that a unit increase in each of the combinations, would result in a decrease in profit. A unit increase in labour*fertiliser showed a positive influence on profit and was noted by a coefficient parameter of 0.189($P<0.003$). Profit inefficiency showed that distance to markets had a negative effect n on inefficiency (-0.0988: $P<0.024$). The condition of roads and market linkage support showed a positive effect on profit inefficiency and were statistically significant at 5 and 10%.

5.3 Conclusion

The food situation in South Africa is characterised by food sufficiency on a national scale in spite of occasional food supply fluctuations. Despite this situation, most South African households experience food insecurity, malnutrition and poverty associated with unemployment (Altman, 2009). In order to address these challenges, commercialisation of smallholder farming is taking centre stage in developing countries in general and South Africa, in particular. The prioritisation is aimed at poverty reduction, improving nutritional status as

well as food security and has been reflected in the policy agenda of the country. A wide range of interventions are proposed in order to deal with food security, poverty and unemployment as follows: production of food; marketing of food products, infrastructure development; and research and technology development, among others.

In theory, smallholder indigenous vegetable farmers in South Africa sell their vegetables to different types of local markets. These markets provide the following advantages: they are easily accessible due to their logistical pre-disposition; provide scale issues; quality; and are less competitive compared to markets reserved for major domestic producers. The challenges faced by these farmers could be addressed by providing farmers with assistance such as training, inputs, finance, farm management skills etc. to solve their socio-economic problems. Most of these problems emanate from institutional and technical challenges in accessing different markets. It is suggested that smallholder farmers should strive to produce and market on their own. Since these farmers faces a number of challenges, there is a need for external support from both government and private parastatals to South African farmers in order to sustain marketing activities over time and, thus improve the profit levels of farmers.

The re-introduction of indigenous vegetable production has been adopted by farmers in South Africa. Production and marketing seems to be more sustainable due to the support provided to farmers. External interventions increase the probability of farmers to embark on production and marketing of vegetables. They have been able to show an improvement in some aspects related to marketing of indigenous vegetables. Support should, however, focus on capacity building in order to prepare farmers to confront challenges emanating from the market place if they are to stay and benefit in such markets. Smallholder indigenous vegetable farmers should be trained on business, logistical and business skills.

5.4 Recommendations

It is clear that agriculture should be part of the rural growth strategy for farmers in South Africa. High reliance on agricultural income by rural households should ensure that any strategy designed should build upon the economic base made available by agriculture. The results obtained in this suggest a number of ways in which public and private interventions may be directed in order to achieve a significant impact on market participation and profit for farmers. It is in the light of these findings that the following recommendations are made.

5.4.1 Support and market participation

Agricultural support forms an essential part in the income of farmers. It was found that support provided to farmers was of great help as it assisted farmers with input packages, facilitated the removal of produce from the farm to the point of sale, transferred knowledge and information to farmers and also transferred skills to farmers through trainings. It is, therefore, recommended that enterprise support programmes be enhanced since they are of great help to farmers. In light of this, special attention should be paid to the following:

- Improvement of commodities

  It was revealed in the study that the type of commodity (spinach, mustard and amaranth) influenced market participation. Output quantity and quality should be stimulated in order to ascertain sustainable market participation and

- Collective action

  Being a member of a cooperative has a positive result and significance in terms of participation in markets. There is a need to form agricultural marketing cooperatives in order to address some of the marketing challenges encountered by farmers. External interventions should focus on increasing probability of a cooperative to embark on collective marketing at an initial stage as demonstrated in the literature. Collective competiveness decreases in cooperatives formed by the government than those formed by NGOs. The other option could be to support smallholders as a collective and link them with policy actors such as private businesses and research communities. Farm cooperatives should be enhanced with skills and trainings in agribusiness in order to assist them understand their statutory function. In this way, the quality of participation of members will be improved, which will in turn, steer cooperatives towards success.

- Support of extension services

  The purpose of agricultural extension is to build economic capacity of farmers and improve its economic future and the quality of life for all. The study acknowledges and appreciates the efforts and initiatives of government in ensuring and promoting extension services, much more needs to be done to realise growth and development.

5.4.2 Improving input support and profitability

Smallholder farmers in South Africa and other developing countries have failed to make profits in vegetable marketing due to failure to produce consistent volumes of quality demanded. Although fertiliser was not significant to profit, it showed a positive effect on profit; this is an indication that if fertiliser usage is increased, profit will increase significantly. Although a unit increase in seed showed a negative effect, it is still evident that if farmers are trained on proper application rates, an improvement in profit could be realised. To ensure proper usage of both seed and fertiliser, government, parastatals and the private sector should inject sufficient capital on training and input support for smallholder farmers if they are to be integrated with efficient marketing.

5.4.3 Improving the profit efficiency of smallholders

Linking farmers to markets has shown positive results to profit efficiency. It is, therefore, recommended that linking farmers to the markets be enhanced with the aim of equipping farmers with marketing skills and a clear exit strategy by supporting organisations for farmers to be able to develop marketing independency.

Marginal land size should be awarded to farmers and assistance provided to them to join in the production of high value crops for the benefit of their food security, income and nutritional status. The empirical results indicating the importance of land size as a determinant factor for market participation justifies intervention. Improving farm size could increase total production by enabling more productive smallholders to expand production. Land redistribution programmes seeking to increase smallholder ownership of land may be justified on the basis of sustainability considerations, as own land can also assist farmers to qualify for support services from different stakeholders.

5.5 Areas for further research

With the spread of supermarkets to the rural areas in South Africa, an opportunity arises for the incorporation of smallholder vegetable farmers to access to markets at both local and international levels. Research is required on how smallholder farmers can be assisted to better explore the need for indigenous vegetables in other countries so that farmers can participate in international markets. Such research should be done at a national level for policies to favour most farmers in South Africa.

Another area that needs to be investigated is the effect of support programmes on market participation and profitability of indigenous vegetable farmers using a longitudinal data set. In this way, the study will be able to give a clear vision on market participation and profitability over time and for challenges and successes to be recorded accordingly. Furthermore, policies to address explicit challenges and improvements on certain aspects could easily be formulated. Lastly, farmers should be empowered with information on other African vegetables (that have not been researched on) that are on high demand for them to have a wide range of production. This can be done by conducting consumption and market surveys with both markets and consumers.

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Appendix 1 - Questionnaire

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

ARC • LNI

Date of interview_____
Questionnaire no._____
Province_____

SECTION A; SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS

A1. Gender of respondent: Male Female

A2. Age of respondent

A3. How do you farm? Full time Part time

A4. Marital status Married Single **A5.** Highest level of education Primary Secondary Tertiary

A6. Household size.....**A7.** Primary sources of income of household

Farming		**Remittance**	**Formal employment**	**Credit**	**Other (specify)**
Vegetables	**livestock**				

A8. Tillage implements used Own Communal Rented **A9.** Are you a member of any co-operative? Yes No

A10. Farming experience (years).....**A11.** What is the total size of the farm? (ha)

A12. What is the total area under vegetable production (ha)?.....**A13.** How long have you been growing vegetables? (Years)..... **A14.** Land ownership

Owned	Communal	Leased	Rented	Other (specify)

A15. Land condition

Fertile(ha)	Degraded(ha)

A16. Farm assets

Assets	**Number**	**Source**	**Current market value**
Car			
Tractor			
Buckie			
Other (specify)			

SECTION B: CROP PRODUCTION AND MARKETING INFORMATION

B1. Which crops did you grow in the last season?.....

B2. For the vegetables grown last season, please complete the table below.

Crop grown	**Area planted (units as given by farmer)**	**Total production (units as given by farmer)**	**Quanti ty sold**	**Name/type of market**	**Average price**	**Distance to market**	**Condit of the r (1=goo 2=aver 3=poor**

B3. Why did you choose to utilise these markets? (Tick)

Close to the farm	

Offer good prices	
Only market available	
contracted	
Other (specify)	

B4. Where do you get information on markets that you use? (Tick)

Source of information	**Type of information provided**				
	What to produce	**Where to sell**	**Unit price**	**Quality & quantity requirements**	**Degree of value addition required**
Radio					
Extension officers					
Other farmers					

B5. Indicate which inputs were used in the production of these crops

Input	**Source**	**Quantity**	**Total price (R)**
Fertiliser			
Seeds			
Chemicals			
Manure			
Other (specify)			
Implements			**Current market value (R)**
Wheelbarrow			
Forks			
Spades			
Hoes			
Hosepipe			
Others (specify)			

B6. How much on average do you pay for labour?

Type of labour	**Number of labourers**	**Amount paid (R) (unit as given by farmer)**
Temporary		
Permanent		
Other (specify)		

B8. How would you classify finding markets for the vegetables you produce? Easy Moderate Difficult

B9. What happens to unsold produce? (Tick)

Lose to spoilage	**Consumption (family & friends)**	**Local community market**	**Store and sell later**	**Process it**	**Other (specify)**

B12. Marketing challenges faced by the farmer

CHALLENGES	**Tick**	**Possible solutions/relevant institutions**
Availability of transport		
Availability of storage		
Quality of products		
Quantity of products		
Price of products		

Distance to markets		
Information about markets		
Transaction costs		
OTHER		

SECTION C: SUPPORT SERVICES RECEIVED

C1. Since you have been engaged in production of indigenous vegetables, have you received any support services? YES NO

C2. If yes, specify what type of support and by whom

Support	**Source**	**How often do you receive support (1= when needed, 2= during planting, 3= monthly, 4= every 6 months, 5=annually)**
Input support		
Extension services		
Infrastructure support		
Marketing linkages		
Other (specify)		

C3. How has the support received influenced the following? (Tick)

	Improved	**Decreased**	**No impact**
Productivity of vegetables (1= product output levels, 2= product quality)			
Marketing access			
Financial situation			
Contact with other farmers			
Other (specify)			

C4. Rate your contact with support institutions

Institution	**Rate support (1= good, 2=fair, 3= bad)**
DOA (Dept of Agric)	
ARC	
DRDLR	
Other (specify)	

C5. Besides the current support, what form of support would you wish for?

Assistance	**Monthly**	**Semi annually**	**When needed**
Inputs (1= seed, 2=fertiliser, 3= chemicals, 4=other-specify)			
Training			
Finance management			
Infrastructure (1=irrigation system, 2=bore hole, 3=shade net, 4=tank, 5 other-specify)			
Marketing			
Other (specify)			

SECTION D: FINANCIAL INFORMATION

D1. Source of finance to run the farm

Farming	**Formal employment**	**Credit**	**Social grants**	**Other (specify)**

D2. How do you utilise money received from farming?

Household needs	**Expanding farming business**	**Pay school fees**	**Pay credits**	**Other (specify)**

D3. Do you have access to credit? Yes No

D4. If yes, tick source

Bank		Family society		Farmers society		Loan shack		Other (specify)	

D5. If no, why?

Do not know about		Do not qualify		No credit facilities nearby		High interest rates		Do not need it	

THANK YOU FOR YOUR TIME!!!!