

**DETERMINANTS OF COMMERCIALIZATION AND THE CHOICE OF MARKET
OUTLETS AMONG SMALL-SCALE GROUNDNUT FARMERS IN CAPRICORN
DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA**

by

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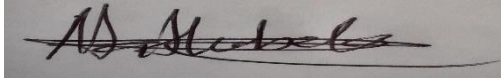
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APRIL 2021

DECLARATION 1

I declare that the mini-dissertation hereby submitted to the University of Limpopo, 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; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

A rectangular box containing a handwritten signature in black ink. The signature appears to be 'AS Mubela'.

20 April 2021

Surname, initials (Title)

Date

DECLARATION 2 - PUBLICATIONS

The following publications will form part of the research presented in this thesis.

Publication 1 – Objective 2

Sakkie M Mathobela, Abenet Belete and Mmaphuti A Nkoana. Determinants of commercialization among small-scale groundnut farmers in Capricorn district, Limpopo, South Africa. The paper will be submitted to Journal of Human Ecology before end of 2020.

Publication 2 – Objective 3

Sakkie M Mathobela, Abenet Belete and Mmaphuti A Nkoana. Analysis of factors influencing the choice of groundnut market outlet of the small-scale groundnut farmers in Capricorn district, Limpopo, South Africa. The paper will be submitted to Journal of Human Ecology before end of 2020.

DEDICATION

This study is dedicated to my family and friends who sacrificed immensely towards the success of my studies and a brighter future.

ACKNOWLEDGEMENTS

First, I would like to thank the Almighty God for the continued strength, my family for the support and sacrifices they made for me to have a bright future and everyone who assisted me towards the completion of my studies.

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Thank you.



ABSTRACT

Groundnut is one of the most important agricultural crops in South Africa. It provides economic and health benefits to the society. Its production, processing and marketing provides employment to several individuals in South Africa. The objectives of the study were: to identify and describe the socio-economic characteristics of small-scale groundnut farmers, analyse the determinants of commercialization and the factors influencing the choice of market outlet in Capricorn district. The study was conducted in three villages (Ga-Maja, Ga-Mphahlele and Moletjie). Purposive sampling technique was used to select 110 small-scale groundnut farmers. Semi-structured questionnaires were used to collect data from the small-scale groundnut farmers through face-to-face interviews. The data was analysed using the descriptive statistic, Logistic Regression and Multinomial Logit model. SPSS and STATA software were used to process the data. The results indicated that quantity of groundnut produced, occupation, marital status, household size, land size, vehicle ownership, access to credit and extension contact significantly influenced the commercialization and the choice of market outlet of the small-scale groundnut farmers in the study area.

The study recommends that the government in collaboration with universities and agricultural colleges as well as the private sector initiate an extension programme that will focus on small-scale farmers, rather than on emerging and commercial farmers only. This will enable the small-scale famers to get access to information on the market, production, price and other agricultural related activities. It further recommends that the Department of Agriculture visit areas where farmers produce the same type of crops and offer them incentives to pool their resources and market their produce collectively. This will improve the bargaining position of the small-scale farmers as well as the means of lowering transaction costs.

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LIST OF ABBREVIATIONS

DAFF	Department of Agriculture Forestry and Fisheries
IRFPI	International Research Food Policy Institute
MDGs	Millennium Development Goals
USAID	United States Agency for International Development
FAO	Food and Agriculture Organization
ARC	Agricultural Research Council
WBRDS	World Bank Rural Development Strategy
BFAP	Bureau for Food and Agricultural Policy
SAGIS	South Africa Grain Information Services
PPS	Probability Proportionate to Size
STATA	Statistics and Data
SPSS	Statistical Package for the Social Sciences
HCI	Household Commercialization Index
LRM	Logistic Regression Model
RUM	Random Utility Model
MLM	Multinomial Logit Model

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CHAPTER 1: INTRODUCTION

1.1. BACKGROUND

Groundnut (*Arachis hypogea*) is a self-pollinating annual plant herb (legume) belonging to the pea family of Fabaceae (Ani *et al.*, 2013). It originated in South America (Bolivia and adjoining countries) and is now growing through-out the tropical and warm temperate regions of the world (Department of Agriculture Forestry and Fisheries, 2010). Groundnut is one of the most popular and universal crops cultivated in more than 100 countries in six continents (Ani *et al.*, 2013). Major groundnut producing countries include China (16,685,915 tons per annum, India (6,857,000 tons/annum), Nigeria (3,028,571 tons/annum), USA (2,578,500 tons/annum) and Sudan (1,826,000 tons/annum). South Africa's groundnut production varies between 80 000 and 250 000 tons per annum. Production mainly takes place in the tropical and subtropical regions of the world, particularly on sandy soils, with the bulk of groundnut crop in South Africa produced on light textured soils ranging from coarse and fine sands to sandy loams (Cilliers, 2006).

According to Cilliers (2006), the production practices of groundnut vary from highly sophisticated commercial ventures in the western world to more traditional cropping practices in the third world countries. Groundnut is growing on 25.2 million hectares of land with a total production of 35.9 million metric tons worldwide, making it the 13th most important crop and the 4th most important oilseed crop in the world (Ani *et al.*, 2013). The seeds contain 40-50% fat, 20-50% protein and 10-20% carbohydrate (Cilliers, 2006). Thus, nutritionally, it is a good source of vitamins and essential minerals. The seeds are consumed raw, roasted or boiled (meal) and the oil extracted from the seeds is used as culinary oil. The oil is used to produce margarine, crackers/cookies, candy, salted groundnut, salad oils, nut chocolates, sandwiches, and soaps. Furthermore, the groundnut plant has multiple uses as they can be used as animal feed (green material and straw) and industrial raw material (oil cakes and fertilizer). Thus, these multiple uses of the groundnut plant make it a good cash crop for domestic markets as well as for foreign trade in several developing and developed countries (Carlberg, 2012).

According to DAFF (2010), groundnut is produced in the summer rainfall regions under irrigated or rain-fed conditions. The small-scale farmers in northern and eastern parts of South Africa produce it mainly for consumption. The production is dominated by the western regions of South Africa, with 40% of production taking place in the western and northwestern Free State. The North West and Northern Cape production is at 29% and 24% respectively, whereas Mpumalanga and Limpopo have the lowest productions. Groundnut is an important source of nutrition in the northern KwaZulu-Natal and Mpumalanga areas. The overall groundnut production in South Africa decreased, the country produced only 20% compared to production from three decades ago (GrainSA, 2012). In South Africa, the crop is commonly known as groundnuts, peanuts, *matokomane*, and *dzinduhu*. The crop mostly grows in rotation with maize to improve disease, weed and pest management in both crops. As with most legumes, the groundnut plant's root system contains nodules of nitrogen-fixing bacteria.

Over 330 products are produced commercially from groundnut, and jobs can be created directly from enhanced groundnut production (Coulibaly, 2000). This necessitates the need for commercialization of the industry. This commercialization can be achieved through the improvement in variety of technology, with corresponding increase of cultivated hectares. Commercialization acts as a catalyst to agricultural development and is viewed as a categorical concept used to classify farmers according to the portion of their produce destined for the market (Martey *et al.*, 2012; Poulton *et al.*, 2008), and it reflects the farmer's stage of development. According to the International Research Food Policy Institute (IRFPI) (2005), the process of commercialization in the present is unique compared to what it was a decade ago. Agribusiness and its scale are what influence the process of change. This led to a greater degree of integration between producers and the output market, with a strong emphasis on standards in relation to quality and safety. Even commodities are becoming differentiated products due to particular requirements of the market; to meet the quality, size, and delivery standards, and new transaction costs have emerged that have raised the cost of entry even more into certain product markets.

Ouma *et al.* (2010) state that the agricultural sector remains a major sector and is the backbone in most Sub-Saharan Africa including South Africa. Accelerated growth in agriculture is critical if the Millennium Development Goals (MDGs) are to be achieved in Africa. Growing population, urbanisation, income, global interconnectedness, policy reforms, and technology contribute to the changing environment, which calls for the transformation of agriculture (Barret, 2008). Specialisation, the development of markets, and trade are some of the characteristics of commercialization and are fundamental to economic growth. The increase in demand for agricultural products pushes for renewed approaches to farming making the operating environment more enabling and making operations more efficient, these are some of the drivers of agricultural commercialization and these ultimately increase the small-scale farmer's commitment to commercial activities (Zhou *et al.*, 2013). Rural growth, increasing agricultural labour productivity, direct income benefits, expansion of food supply and improving the nutritional status of the small-scale farmers are some of the benefits of commercialization (Hazell *et al.*, 2007). There is a need to understand the linkages underlying crop production, commercialization, income, consumption and nutrition at the household level (Carletto, 2017).

Intensification and commercialization of small-scale agriculture is recognised as one of many international and national policies of the government. It is argued that the efforts arranged to intensify the agricultural sector will only be beneficial to the large-scale commercial farmers. The commercialization of the sector requires improving the ability of the small-scale farmers to participate in markets, as markets and improved market access are indispensable in improving the livelihood of the small-scale farmers. Increased commercialization shifts farm households away from traditional self-sufficiency goals toward profit and income oriented decision-making; farm output is accordingly more responsive to market needs. However, fragmentation and geographical isolation preclude the small-scale farmers from reaching the formal markets (Mmbando, 2014). Markets act as a pivotal point in the agricultural transformation process. Reardon and Timmer (2007) indicate that the opportunity to specialise according to comparative advantage could be derived from the markets, which in turn offers welfare gains from trade. The recognition of the potential markets as engines of economic development and structural

transformation gave rise to a market-led paradigm of agricultural development during the 1980s.

Barret (2008) identify market access as one of the critical factors influencing the performance of small-scale agricultural development. However, there are various markets or marketing outlets, that the small-scale farmer can choose, and this is, to some extent determined by the small-scale farmers' capabilities. Sigei *et al.* (2014) state that the decision on where the small-scale farmer should sell or not sell is determined by the prices in that market outlet. The decision on where to or not to sell the groundnut is the "choice for the marketing outlet of the small-scale farmer". A major reason why even those rural farmers who can produce a surplus remain trapped in the poverty cycle is lack of access to profitable markets.

The United States Agency for International Development (USAID) (2010) indicates that the small-scale farmer's choice of market outlet is imperative in market participation decision. These market outlets include farm gate, local and the urban market. Local market includes supply to traditional markets such as hawkers and open markets and the markets are mostly informal. The urban market includes supply to urban market, retailers or the farmers that are integrated into formal agribusiness value chains such as agro-processors (Kirsten & Sartorius, 2002). Louw *et al.* (2007) identify that most small-scale farmer in remote areas supply to traditional markets. The success and failure of small-scale commercialization is influenced by many enabling and constraining factors that can be physical, political, economic, socio-cultural, technological and individual.

1.2. PROBLEM STATEMENT

Agricultural production on a large and commercialized scale is one of the most prioritised objectives of the developmental efforts in South Africa and Africa as a whole. South African economy is regarded as an agrarian economy, however, the challenge is that small-scale farmers who are predominantly rural dwellers dominate production. The agricultural sector continues to be strategic in the development of most developing countries such as South Africa where small-scale farming is the dominant livelihood activity (Osmani & Hossain, 2015). Food and Agriculture Organization of the United Nations (FAO) (2011) estimated that half of the developing countries' hungry population is low-income small-scale famers. These small-scale famers depend heavily on the low production as ascribed to the small portions of land available to them. The small-scale farmers (with plot sizes of less than 0.5 ha) depend heavily on what they can produce on the small plots for both their income and their nutritional needs.

According to Carlberg (2012), the increase in household food levels, nutritional benefits, income generation, and soil fertility make groundnut an important crop to agriculture and economic growth. The crop having high economic value necessitates its production and this allows the small-scale famers to receive a higher price at the markets (Cilliers, 2006). The commercialization of agriculture, or the process by which agricultural systems move from subsistence production to one in which products are sold in the market, has been a prominent force of change among small-scale farmers throughout the recent years. Dube *et al.* (2013) define agricultural commercialization as the situation where small-scale farmers have greater engagement with the market. It seems intuitive that agricultural commercialization would lead to improved standards of living, and thus improved food security among these small-scale farmers who grow groundnut as cash crop. There are different marketing outlets whereby the small-scale farmers can sell their produce, the widely known marketing outlets being farm gate, local and urban markets. Park and Lohr (2006) indicate that farmers who sell through a diversified set of outlets have increased earnings relative to farmers who overlook these marketing options. The small-scale famers need to take advantage of these marketing outlets as they provide an opportunity

for expansion through income acquisition and profit maximisation within these different outlets.

Despite the focus of policy and efforts on increasing the rate of commercialization, and the importance of agriculture, the small-scale farmers are not partly engaged in commercial agriculture. The level of agricultural commercialization in South Africa is increasing, however at a slow pace (Agricultural Research Council, ARC, 2015). Regardless of the prevailing information on agricultural commercialization, small-scale farmers in the Limpopo province produce low yields as compared to other provinces, as such, it becomes imperative to identify the indicators that lead to this low production. However, this study focuses on the determinants of commercialization with an objective of analysing the factors that have significant influence on the commercialization of groundnut. Thus, to effectively assist the small-scale farmers to improve their livelihoods and their food security, it is crucial to understand the determinants of groundnut production and how they influence the commercialization of these small-scale groundnut farmers. Furthermore, various marketing options are analysed to identify the factors that influence the small-scale farmers to sell the groundnut at different markets. Therefore, this study analyzes the determinants of commercialization and factors affecting the choice of marketing outlets.

1.3. RATIONALE OF THE STUDY

The small-scale farmers who mainly engage in subsistence agriculture have lower marketable returns, leading them to be in low equilibrium poverty trap (Barret, 2008; Park & Lohr 2006). According to Sigei *et al.* (2014), market-oriented production could achieve the welfare gain through specialisation and comparative advantage, economies of scale, regular interaction and exchange of ideas. According to the Agricultural product standards Act, 1990 (Act no. 119 of 1990), different standards, grades and classes of groundnut provide significant returns to the small-scale farmer at the markets. Furthermore, these different standards, grades and classes improves the marketing and bargaining power of the small-scale groundnut farmers as they enter the market with variety of groundnuts. Rabbi *et al.* (2017) indicated that for the most part, there is an agreement that commercialization affects different socio-economic groups differently (rich and poor, landowner and landless farmers, women, and children) under different socio-economic, institutional and policy environments. Thus, this necessitates commercialization as it provides incentives to reduce famine and improve the overall standard of living, making the farmers' transition from subsistence to commercial a crucial factor.

Agricultural commercialization is usually a long transformation process from subsistence to semi-commercial, ultimately to a fully commercialized agriculture with the main objective of achieving food self-sufficiency (Osmani & Hossain, 2015). Unfortunately, most small-scale farmers who need this kind of welfare boast have been constrained by several factors in their quest to participate in the market for their goods and services. The small-scale farmers selling their commodities at lower farm gate prices are unable to make enough returns to cover the costs of producing the groundnuts, thus, better farm incomes and household food security are threatened.

Provided the information on the determinants of commercialization and the factors affecting the choice of market outlets, the small-scale farmers will be able to take advantage of favourable prices in the urban markets and become eager to commercialize since the sales returns are improved. Therefore, the determinants influencing the capacity of small-scale farmers to participate in the different markets need to be considered essential to improve their productivity and production. Kirui and Njiraini (2013) state that

commercialization by small-scale groundnut farmers will expand their livelihood because of increased income. The information on how small-scale farmers can actively participate in the market is vague in the area of Capricorn District. Furthermore, not many studies have been carried out in Capricorn District concerning small-scale groundnut farmers, particularly the factors that are responsible for small-scale groundnut farmers embarking on commercialization of groundnut farming. Therefore, this study attempts to analyse the determinants of commercialization among these small-scale groundnut farmers to participate in the market, subsequently bridging the gap of knowledge on how these farmers market their groundnuts. Furthermore, knowledge by way of literature will be added to indicate how these farmers participate in different markets as well as the choices that lead to the difference in markets.

1.4. Aim and objectives

1.4.1. Aim

The aim of the study was to analyse the determinants of commercialization and choice of market outlets among small-scale groundnut farmers in Capricorn district, Limpopo province.

1.4.2. Objectives

- i. To identify and describe the socio-economic characteristics of small-scale groundnut farmers in Capricorn district, Limpopo province.
- ii. To analyse the factors affecting commercialization of small-scale groundnut farmers in Capricorn district, Limpopo province.
- iii. To analyse the factors influencing the choice of groundnut market outlets of the small-scale groundnut farmers in Capricorn district, Limpopo province.

1.4.3. Hypotheses

- i. Socio-economic factors do not affect commercialization among small-scale groundnut farmers in Capricorn District.
- ii. Socio-economic factors do not affect the choice of market outlet among small-scale groundnut farmers in Capricorn District.

1.5. Organisational structure of the dissertation

Chapter 1 discusses the background, problem statement, rationale of the study, aim and objectives, research hypotheses and the organisational structure of the study. Chapter 2 presents the literature review from previous studies, definition of key concepts, review of agricultural commercialization, choice of market outlets and the determinants. Chapter 3 discusses the methodology of the study, that is, the study area, sampling procedure, data collection and data analysis. Chapter 4 highlights the results of the study and the analysis which includes descriptive statistics, logistic regression model and multinomial logit model. Chapter 5 discusses the summary, conclusion and recommendations of the study.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

This chapter reviews theoretical and empirical literature relating to small-scale commercialization and market outlet choice. The chapter starts by offering some definitional aspects of the terms and concepts of the study including small-scale farmers, groundnut production, commercialization and market outlet. An exact understanding of these terminologies is important in explaining small-scale farmers' market outlet choice and commercialization in the study area. This chapter also reviews literature on the determinants of small-scale farmers' commercialization and decisions on market outlet choice in developing countries.

2.2. Definition of concepts

2.2.1. Small-scale farmer

Kirsten and van Zyl (1998) indicate that the term "small-scale" in South Africa is often equated with a backward, non-productive, non-commercial, subsistence agriculture that is found in parts of the former homeland areas. The small-scale farmers are whose scale of operation is too small to attract the provision of the services they need to be able to increase their productivity. Kirsten and van Zyl (1998) further outline that this is generally associated with black farmers. According to the World Bank's Rural Development Strategy (2003), small-scale farmers are defined as having low asset base, operating in less than 2 hectares and depending on household members for most of the labour. This indicates that the small-scale farmers are defined in diverse ways depending on context, country and ecological zone. (Mmbando, 2014), suggests that these diverse definitions explain the interchangeable use of the term 'smallholder' with 'small-scale'. Farmers with limited resource endowment, relative to other farmers in the sector are termed small-scale farmers (Food and Agriculture Association, 2003). The general definition of small-scale farmer revolves around poor limited and poor resource use, limited land, the use of family members as labour, and farming to produce for self-subsistence and sometimes for markets.

2.2.2. Small-scale agriculture

Production of crop and livestock taking place on a small-piece of land without the utilization of advanced and expensive technologies is described as small-scale agriculture. There are some debates indicating that farming on family pieces of land, on traditional lands and smallholdings on the periphery of urban areas, falls in this category. Unlike large-scale commercial farming, it is characterised by intensive labour, animal traction, resource redistribution between food and cash crops, off-farm activities, use of external inputs, limited use of agrochemicals, supply of the local or surrounding markets and it plays a dual role of being a source of household food security as well as income sale of surplus. Economically, small-scale agriculture enhances local economic development, as it is a source of employment and keeps most of the income local as the market is predominantly localised and socially, especially on traditional lands, the produce is first meant to feed the household thereby contributing to food security.

2.2.3. Groundnut production in South Africa

Groundnuts are mainly produced in the north-western regions of South Africa. These include the western and northwestern Free State, Northern Cape and the North West Province. Production also takes place in Limpopo, Mpumalanga and KwaZulu-Natal. However, the production is lower in these provinces (DAFF, 2010). The overall production of groundnut has been declining since the mid-1980s, with major reasons including higher labour cost and slow seed-breeding developments. The Bureau for Food and Agricultural Policy (BFAP) (2017) indicates that South Africa is one of the least producers and exporter of groundnut. The production in 2016/17 at 18 850 tons, was the smallest since 1945/46. However, South Africa is usually self-sufficient in terms of groundnut production. According to the South Africa Grain Information Services (SAGIS) (2017), the country has been importing mainly from Argentina, Brazil and Mozambique, with India and Malawi being alternatives. Groundnut production in the country is usually higher than consumption with exports to Mozambique, Japan, Netherlands and Belgium. The domestic price is more or less on par with the international price and not influenced much by the size of the local crop.

2.2.4. Importance and use of groundnut

Human consumption, industrial manufacturing and livestock consumption are some of the uses that groundnut offers. The seeds yield a non-drying, edible oil that can be used in cooking, processed into margarines, salads, canning, for deep-frying, and for shortening pastry and bread. The seeds are eaten raw, completely roasted and salted, chopped in confectioneries or processed into peanut butter. The young pods are consumed as vegetables and the young leaves are suitable as a cooked, green vegetable. Various other products include ice cream, massage oil and peanut milk. For industrial use, the groundnut oil is used for pharmaceuticals, soaps, cold creams, cosmetics, dye, paints, pomades and lubricants, emulsions for insect control and fuel for diesel engines. The hulls are used for fuel and as filler for fertilizers. High-protein livestock feed is one of the livestock uses of groundnut. Foliage provides silage and forage with the hulls used also as livestock feed. The vines and leaves provide high-protein hay (DAFF, 2010).

2.2.5. Agricultural Commercialization

The development of agriculture from subsistence to commercial farming has become indispensable in developing countries such as South Africa. This development is brought about by the transition from primitive to modernised way of farming. This transition is generally termed 'Agricultural commercialization' in the agricultural sector. Commercialization of agriculture refers to the development and promotion of a profitable agricultural production and marketing system, such that agricultural products are competitive locally, regionally and internationally. Goletti (2005) describes agricultural commercialization as the shift from subsistence production to a more sophisticated production based on the market. Pingali (1995) states that agricultural commercialization includes marketing of the agricultural output and that it is based on the principles of profit maximization. Von *et al.* (1994) define the concept as more of an increase that can occur outside of production, increased marketable surplus and an increase in the inputs used in the production. Due to its capability to induce economic growth, urbanization and the withdrawal of labour from the agricultural sector, the commercialization of agriculture is termed endogenous. Alternatively, economic growth, urbanization and the withdrawal of

labour from the agricultural sector lead to the increasing commercialization of agriculture. According to Gebremedhin *et al.* (2009), commercialization of agriculture has been essential as a means of enhancing food security, nutrition and income. Agricultural commercialization is essential to the small-scale farmers as opposed to the well-established commercial and exporting farmers. This brought about the attention of researchers to focus on the significance of agricultural commercialization as it can serve as an alternative measure to improve the livelihood of the small-scale farmers. Lundy *et al.* (2002) indicate that for small-scale farmers to survive in a competitive global economy, it is essential for them to be able to produce for the market rather than subsistence. The environment where the small-scale farmers produce for markets rather than attempting to market what they produce should be eliminated. A virtuous cycle wherein small-scale farmers intensify their productivity with more inputs and sophisticated machinery as well as achieving greater output per unit of land is termed small-scale commercialization. The aim is to produce greater farm surpluses or rather transition from deficit to surplus producers and to extend their participation in markets that will ultimately increase their incomes and living standards (Jayne *et al.*, 2011). For many agrarian economies, small-scale commercialization is a crucial feature of the structural transformation process that is considered by most development economists to be the major pathway from a subsistence society to a more diversified and food secure economy with higher general living standards.

Several studies indicate that small-scale commercialization has a significant effect on the overall level of food security (Barrett, 2008; Von Braun, 1995; Juma, 2010). Von Braun (1995) states that commercialization has a direct effect on the small-scale farmer's income level whilst Ochieng *et al.* (2015) argue that it has robust and positive effect on household food security. It significantly increases household dietary needs and reduces the number of coping strategies adopted during food shortage. However, Maertens *et al.* (2012) argue that small-scale commercialization's implication on food security are not yet understood and the findings are not always in consensus. Similarly, it is argued by (Strasberg *et al.*, 1999) that better access to food depends on income growth, in particular, to most African small-scale farmers where agriculture is the main source of

income. This implies that improving the degree of market participation can have a big impact on the status of the small-scale farmers' food security.

Taking into consideration both past and recent literature, the gains of agricultural commercialization are multifaceted. It is described as a bridge through which small-scale farmers are able to achieve their welfare goals (Gebreselassie & Sharp, 2007). These welfare goals include consumption of basic food, high value foods, expenditure on clothes, durable goods as well as education and health care. Through commercialization, the small-scale farmers will be able to have greater engagement in output markets. These markets will result in higher agricultural productivity that will facilitate the welfare goals of the small-scale farmers. The role of agricultural commercialization is significant in stimulating rural growth via increased incomes and employment. Furthermore, expansion of food supply and improvement in nutritional status are realised (Gebreselassie & Sharp, 2007).

According to Muricho (2015), the impacts of agricultural commercialization are categorised into three orders; first, second and third order. Impacts in the first order are immediate and have direct influence on the income and employment of the household. Health and nutrition being the second order and lastly, macro-economic and environmental impacts the third order impacts, they are usually beyond the household level. Health and nutrition is dependent on the level of income gained through existing commercialization. Goletti (2005) indicates that various degrees of commercialization exist, that is, low and high degrees. The former pertains to when farm production is essentially for subsistence purposes with little surplus sold in the market. The farmers in the latter produce only for the market and are integrated with dynamic markets. That is, in the latter, farming is a profession and income stabilisation and profit making are among the major concerns of the farmer rather than issues of food security. Agricultural commercialization enhances the links between the input and output side of agricultural markets. Commercial production of groundnut is likely to result in welfare gains through the realisation of comparative advantages of economics of scale and from dynamic technological, organizational and institutional change effects that arise from the flow of ideas due to exchange based interaction (Romer, 1993).

2.2.6. Factors affecting agricultural commercialization

According to Abera (2009), for small-scale farmers to achieve the objective of welfare from agricultural commercialization, the factors influencing agricultural commercialization need to be understood. The factors influencing the small-scale farmer's decision to participate in the markets are also critical for them to achieve their goals. The factors differ in contexts. Pender and Dawit (2007) identify factors that affect commercialization at local level based on the findings of different studies by Ehui and Place (2006). For small-scale farmers to positively gain from agricultural commercialization there are three critical conditions that need to be in place (Leavy & Poulton, 2007). These are market access, access to staple foods and asset accumulation. The latter refers to land and animal traction. Land utilised effectively increases overall farm production and determines the chance of participation of small-scale farmer to commercialize. Impoverished small-scale farmers tend to be less responsive to the market opportunities (Sitko *et al.*, 2015) because of lack of land, capital and education.

Commercialization is also affected by agro-climatic conditions and risks, access to market infrastructure, community and household resources and endowments, development of local commodity, input and factor markets, laws and institutions, cultural and social factors affecting consumer preference, production and market opportunities and constraints (Leavy & Poulton, 2007). There are however, factors that can either facilitate or constrain agricultural commercialization in developing countries (Mahelet, 2007). These factors include, among others, distance to the market, transport access and road access, availability of credit, extension services and market information, output, input and factor prices, land size, access to modern inputs and storage facilities, as well as integration into the output market.

2.2.7. Market outlet

Producer markets are known to differ in operation and context, and extent of some markets are integrated and complex whilst others are simplified. The small-scale farmer is influenced to choose an outlet that is suitable, taking into consideration the scale of operation and resource endowments. The market outlet choice is described as the farmer's specific decision, and drivers have to be considered as a basis for such decision (Tarekegn *et al.*, 2017). The decision to choose a certain market outlet over the alternative is largely based on profit maximisation that in turn increases the household income. However, there are constraints that affect the choice of market outlet. According to Tarekegn *et al.* (2017), these constraints include resource endowments and access to different market outlets, prices and transportation costs. Lack of market knowledge or difficulties in accessing markets that are more rewarding makes small-scale farmers to transact their produce through an outlet offering a low price.

2.2.8. Factors influencing the choice of market outlet

'Factors Influencing the Choice of Marketing Outlets among Small-Scale Pineapple Farmers in Kericho County, Kenya' by Sigei (2015) concludes that gender, group marketing, pineapple yield, price information, contract marketing, and vehicle ownership significantly influence the choice of pineapple marketing outlets. In addition, the investigation of determinants of market outlet for mango producers in Costa Rica (Zuniga-Arias & Ruben, 2007), highlighted four major factors in the study area. The first factor relates to farm household, (including farmer's experience). Attitude toward risk positively and negatively influences the choice of profitable outlet. Attitude toward risk; the second factor dealt with production system (farm size and production scale); the third determinant was price attributes; the last was market context (having or not a written contract, geographical location and distance to urban market). A study by Lapar *et al.* (2009): 'Market outlet choices in the context of changing demand for fresh meat: Implications for Smallholder Inclusion in Pork Supply Chain in Vietnam' concludes that market outlet choice by consumers of fresh pork in urban cities of Vietnam is shown to be conditioned by factors that are related to their mobility and level of affluence. Time budgets, concerns

about food safety and hygiene, proximity to market outlets, geographical location that captures the effects of income differences, traditional marketing practices and prevailing market infrastructure are also factors attributed to choice of marketing outlet in Vietnam. Bannor and Madhu (2017) when investigating the 'Determinants of the Choice of Marketing Outlet among Kinnow Farmers in Rajasthan State of India' made similar conclusions.

The experience of the farmer in marketing influences the farmer to choose a certain marketing outlet. This is attributed to the farmers who are risk takers and willing to transport their produce to far places. The farm-gate prices are relatively low, making a price one of the important factors that influences the farmer to choose a marketing outlet (Montshwe, 2006). Production or farm size determines the extent of production of the farmer, the larger the farm (production scale) the greater the production. A large production scale positively influences the farmer to sell their produce at the market. The farmers in this case consider the economies of scale with lower transaction costs. A higher price provides an incentive to the selling point, thus, a price has an influence on the choice of marketing outlet. It is noted that when the farm-gate or the market price is higher, the farmer tends to sell at that point. Mmbando (2014) states that contract arrangement guarantees the farmers an existing market, making contract arrangement an important factor that influences the choice of marketing outlet. Mostly, small-scale farmers tend to choose the farm-gate since it incurs no transaction costs. This makes distance in various studies to be a negative influence on the choice of marketing outlet since there are no transactional costs incurred.

Socio-economic characteristics such as age, education and gender also influence the farmer's market choice. Studies by Chirwa (2009) and Anteneh *et al.* (2011), indicate that the farmers' level of education have a significant influence on market choice by smallholder farmers in Malawi and Ethiopia. The educational level of the household head has impact on the market outlet choice by smallholder coffee farmers in Ethiopia (Anteneh *et al.*, 2011). The educational level of household head increases the ability of farmers to gather and analyse the relevant market information for their products and choose the market for better price. Chirwa (2009) analysed the determinants of marketing channels

among smallholder maize farmers in Malawi; the study concluded that education was positively associated with the choice of private traders. Farmers who are more literate tend to be good negotiators and are risk averse. They take into consideration the production patterns and adjust marketing systems according to the different market demands (Zivenge & Karavina, 2012). Determinants of marketing channels among cattle farmers in Namibia by Shiimi *et al.* (2012) indicate that the age of the farmer was positively associated with the decision to sell or not to sell through the formal market. As the age increases, the cattle farmers lose interest in negotiating with buyers in the informal market as it takes time to secure a buyer in the informal market. Girma and Abebaw (2012) analysed the determinants of livestock farmers' choice of marketing channels in Ethiopia. The study found that education and gender of the household head determined the choice of market channels. As educational level increases, livestock farmers choose the final consumers as their market destination in the nearby local markets compared to traders. The gender of the farmer was one of the significant factors in the study of Girma and Abebaw (2012). The results of this study highlighted that male household heads tend to prefer market traders to consumers compared to female household heads.

2.3. Conclusion

The chapter introduced the basic definitions and descriptions of the key concepts regarding the study. The concepts include small-scale farmer, groundnut, and market outlets. The chapter further described the past and current conditions of groundnut production in South Africa. This was followed by a discussion of agricultural commercialization and its factors among small-scale groundnut farmers. The types of market outlets were also discussed in this chapter, as well as the factors that influence the farmer to choose a certain market outlet. Both empirical and conceptual literature were used in this chapter.

CHAPTER 3: METHODOLOGY AND ANALYTICAL PROCEDURES

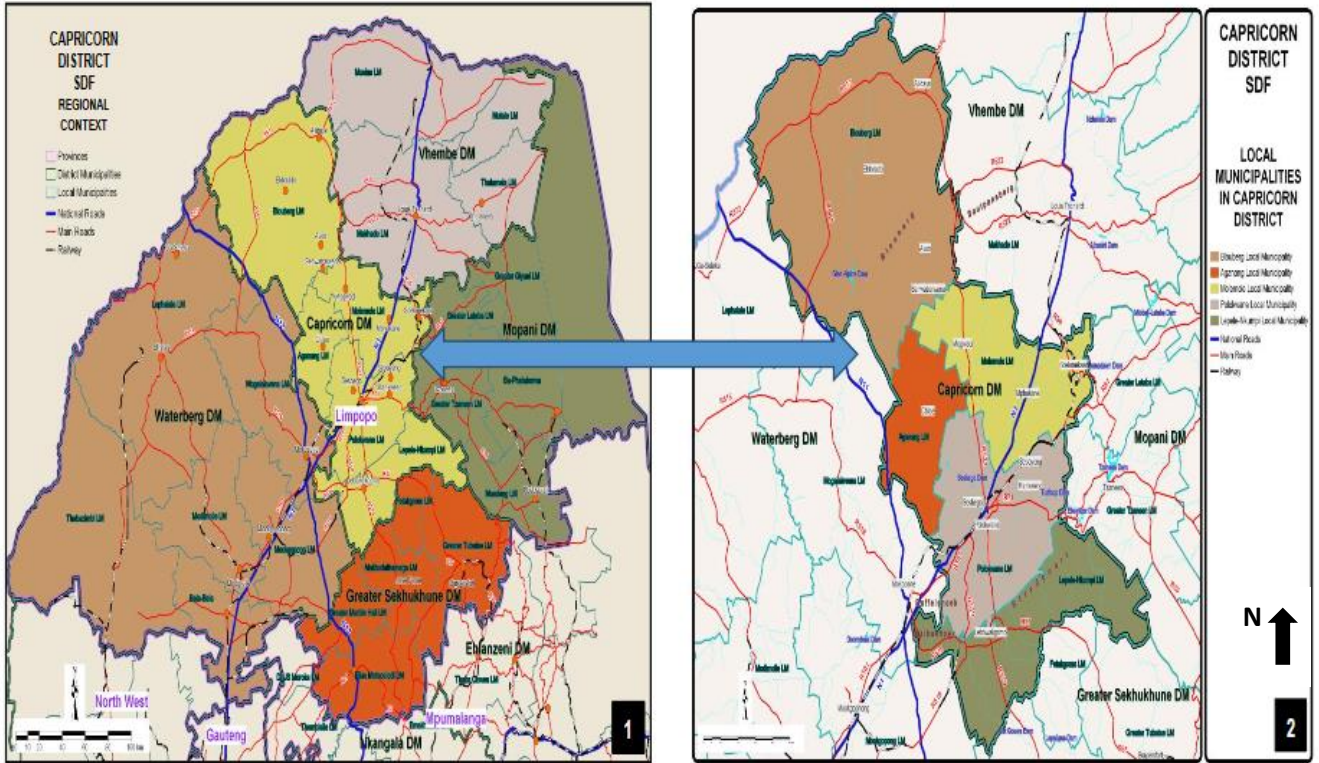
3.1. Introduction

This chapter outlines the methodological framework that was adopted and undertaken in this study. It provides the description of the analytical techniques employed in the study and the data set. The analytical techniques include the Logistic and Multinomial logit regression models. Data collection, questionnaire design and the interview procedures were forms of data set. Detailed discussion on the study area, research design, sampling procedure and data analysis and description of the models and the data set are made in this chapter.

3.2. Study area

The study was conducted in Capricorn district, which is one of the five districts of the Limpopo province. The Limpopo province is situated in the Northern part of South Africa. It is adjacent to the North West province, Gauteng and Mpumalanga provinces and shares borders with Botswana, Zimbabwe and Mozambique. The Province covers an area of 12.3 million hectares accounting for 10.2 percent of the country's total surface area. This is proportionally the largest rural population in the country; its capital city is Polokwane, formerly called Pietersburg and the district is situated at the core of economic development in the Limpopo Province. Capricorn district includes four municipalities namely Polokwane, Lepelle-Nkumpi, Blouberg, and Molemole after the disestablishment of the Aganang Municipality. The majority of its 1 154 673 people speak Northern Sotho (Statistics South Africa, 2011).

One national and various major provincial roads pass through the district municipal area, that is, the N1 -National Road from Gauteng to Zimbabwe and the rest of Africa, the P33/1 (R37) from Polokwane to Burgersfort/Lydenburg, the P94/1 (R521) from Polokwane to Alldays and Botswana and the P17/1 (R71) from Polokwane to Tzaneen and Phalaborwa. (Capricorn District Municipality, 2016). The district is located 23.61 S, 29.23 E. The study was carried out in three villages under the Capricorn district; Ga-Maja, Ga-Mphahlele, and Moletjie.



Source: CDM SDF, 2011

Figure 3.1: Map of Capricorn District

Source: CDM SDF, 2011

3.3. Sampling procedure

The sampling technique involved in this study was purposive or judgmental. The study dealt with small-scale groundnut farmers. Hence, the technique provides basis for judgment as it allows the researcher to identify the farmers with similar characteristics. The data for this study was collected from a total number of 110 small-scale farmers from a sampling frame of 415 groundnut farmers. Probability proportionate to size (PPS) was used to derive the total number of small-scale farmers from each village to be sampled. Probability proportional to size (PPS) sampling is a method of sampling from a finite population in which a size measure is available for each population unit before sampling and where the probability of selecting a unit is proportional to its size.

Table 3.1: Sample size in respective villages.

Areas	Ga-Maja	Moletjie	Ga-Mphahlele	Total
Total number of small-scale	120	186	109	415
Percentage (%)	30	45	25	100
Proportional to size	0.30	0.45	0.25	1
Small-scale farmers interviewed	33	50	27	110

Source: Survey calculations, 2019

3.4. Data collection methods

Primary data was collected by means of a structured questionnaire. The data was mainly quantitative. The questionnaire included a mixture of open and closed-ended questions. The first part of the questionnaire dealt with socio-economic information such as gender, age, educational level, household size of the small-scale farmer etc. The second part dealt with the production information and third part dealt with marketing and market outlets. The small-scale groundnut farmers were interviewed face-to-face. Past literature served as secondary data in this study and this was obtained from published journal articles, websites and government agencies.

3.5. Data analysis and presentation

To analyse data, descriptive statistics, Logistic regression and Multinomial Logit models were used. This was done using software packages such as Statistical Package for Social Science (SPSS) version 25.0 and STATA version 12. The descriptive statistics employs statistical tools such as mean and percentage to describe the socio-economic characteristics in relation to the choice of marketing outlets. Household commercialization index was used to determine the level of commercialization among the small-scale farmers.

3.6. Research methods

Descriptive statistics, Logistic Regression and Multinomial Logit Model were employed to describe the socio-economic characteristics, analyse the factors affecting and influencing commercialization, and the choice of groundnut market outlet of the small-scale farmers.

3.6.1. Household commercialization index (HCI)

$$\text{HCI} = \frac{\text{Gross value of crop sales hh } i \text{ year } j}{\text{Gross value of all crop production hh } i \text{ year } j} \times 100$$

The index measures the ratio of the gross value of crop sales by household i in year j to the gross value of all crops produced by the same household i in the same year j expressed as a percentage. The index measures the extent to which household crop production is oriented towards the market. A value of zero would signify a totally subsistence oriented household and the closer the index is to 100, the higher the degree of commercialization. The advantage of this approach is that commercialization is treated as a continuum, thereby avoiding crude a distinction between “commercialized” and “non-commercialized” households (Agwu *et al.*, 2012). It adds an additional dimension to the discussion as to how much produce is sold. However, Kirui and Njiraini (2013) stipulate that the index is a value bound between 0 and 1 and cannot fall outside of this range, 0 indicating that a household did not participate in the crops output market at all while 1 indicates that a household participated in the crops output market hence it is completely commercialized. Carletto (2017) indicates that the HCI is relatively easy to compute.

3.6.2. Logistic Regression Model (LRM)

To identify key determinants of commercialization, it was necessary to compute a dichotomous variable indicating whether the small-scale groundnut farmer is commercialized or not. That is,

$$C = \begin{cases} 1, & \text{if small-scale farmer is commercialized} \\ 0, & \text{otherwise} \end{cases}$$

Where C denotes the commercialization status of the small-scale farmer.

Therefore, the Logistic Regression Model was employed to analyse the determinants of commercialization of small-scale groundnut farmers since the dependent variable of the model is binary and can only take two values. It allows the estimation of the probability of a certain event occurring. Norusis (2004) indicates that the model is useful considering the fact that it deals with situations in which the prediction of the presence or absence of characteristic or outcome based on values of set of predictors can be obtained.

The term “logit” refers to the natural logarithm of the odds (log odds) which indicates the probability of falling into one of the two categories on some variable interest. Binary logistic regression model refers to the instance in which the observed outcome can have only two possible types (male or female, yes or no). This outcome is coded as “0” and “1” and this offers a clear interpretation. The case, which normally refers to the target group, is coded as “1” and non-case referring to the reference group is coded as “0”. The model uses a likelihood ratio that is defined as the ratio of the likelihood of an event occurring in one group to the likelihood of it occurring in another group. These groups represent the small-scale groundnut farmers who are commercializing and not commercializing. The model allows the measures of the relationship between a categorical variable and usually a continuous independent variable, i.e. it highlights how a set of predictor variables(X's) (explanatory) are related to a dichotomous response variable Y. The dummy variables, also known as indicators characterise the dichotomous response. This is undertaken by converting the dependent variable to probability scores (Hosmer & Lemeshow, 2000).

The small-scale farmers commercializing or not are the two options considered, a binary model will be set up to define Y = one for situations where the small-scale farmers are commercialized and Y = zero for those who are not. Assuming that X is a vector of explanatory variables and p is the probability that Y = one, two probability relationships as stated by Wooldridge (2009) can be considered as follows:

$$P(Y = 1) = \frac{e^{\beta x}}{1 + e^{\beta x}} \quad (1)$$

$$P(Y = 0) = 1 - \frac{e^{\beta x}}{1 + e^{\beta x}} = \frac{e^{\beta x}}{1 + e^{\beta x}} \quad (2)$$

Equation 2 is the lower response level, thus it can be concluded that it is the probability that small-scale farmers are not commercialized. Hence, this will be the probability to be modelled by the logistic procedure by convection (Wooldridge, 2009). Both equation 1 and 2 present the outcome of the logit transformation of the odds ratios and can be presented as:

$$\text{Logit} [\theta(x)] = \log \left[\frac{\theta(x)}{1 - \theta(x)} \right] = \alpha + \beta_1 X_1 + \dots + \beta_n X_n + U \quad (3)$$

Where:

- ❖ θ = Logit transformation of the odds ratio
- ❖ α = The intercept term of the model
- ❖ β = The regression coefficient or slope of the individual predictor (or explanatory) variables modelled and
- ❖ X_i = The explanatory or predictor variables.
- ❖ U = Error term

The logistic regression in this study is specified as:

$$Y = \ln (P_i / 1 - P_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + U \quad (4)$$

- ❖ $P_i / 1 - P_i$ = Odds ratio
- ❖ P_i = Probability that small-scale farmers commercialize.
- ❖ $1 - P_i$ = Probability that small-scale farmers do not commercialize
- ❖ β_0 = Intercept of the model
- ❖ $\beta_1 - \beta_n$ = Estimated parameters
- ❖ $X_1 - X_n$ = Explanatory variables

Table 3.2: Description of variables (Logistic Regression Model)

Variables		Description	Units of Measurement	
Dependent Variable				
HC	Household commercialization	1 if a small-scale groundnut farmer is commercialized, 0 otherwise	Dichotomous	
Independent Variables				
X1	AGE	Age	Age of small-scale groundnut farmers	Years
X2	GNDR	Gender	1 if the farmer is male, 0 otherwise	Dummy
X3	MSTS	Marital Status	1 if the farmer is married, 0 otherwise	Dummy
X4	EDUC	Level of Education	Years of schooling	Years
X5	HSZE	Household size	Number of people in the same household	Number
X6	DTMK	Distance to Market	Distance farmers travel to the market	Kilometers (Km)
X7	LSZE	Land size	Amount of land at farmer disposal	Hectares (Ha)
X8	VOWN	Vehicle Ownership	1 if farmer owns vehicle, 0 otherwise	Dummy
X9	EXTE	Access to extension	1 if farmer have access to extension services, 0 otherwise	Dummy
X10	GYLD	Groundnut Yield	Quantity of groundnuts produced by the farmers	Kilograms (Kg)
X11	OCCU	Occupation	1 if a farmer is a pensioner, 0 otherwise	Dummy
X12	CRED	Access to credit	1 if a farmer has access to credit, 0 otherwise	Dummy

Household Commercialization = $\beta_0 + \beta_1$ (Age) + β_2 (Gender) + β_3 (Marital status) + β_4 (Education Level) + β_5 (Household size) + β_6 (Distance to market) + β_7 (Land size) + β_8 (Vehicle ownership) + β_9 (Access to extension) + β_{10} (Groundnut yield) + β_{11} (Occupation) + β_{12} (Access to credit)

3.6.3. Random utility model (RUM) and Multinomial Logit model (MLM)

The small-scale groundnut farmers in this study had more than two alternative market outlet choices. The Multinomial Logit model was employed since it permits the analysis of decisions across more than two categories in the dependent variables. The model is widely used in studies involving multiple choices that define the dependent variable. The independent variables can be either dichotomous (i.e. binary) or continuous (i.e., interval or ratio in scale) (Gujarati, 2009). The small-scale farmers aim to maximise their utility relative to the choices presented to them. The choices may differ according to the decision maker, i.e. it is assumed that given farmer i in decision making process, consideration of exclusive alternatives constitute to the choice set I^i of groundnut marketing outlets and the choice set may differ according to the decision maker. The farmer i assigns each alternative j in his/her choice set of perceived utility U^i_j and selects the marketing outlet that maximises his/her utility. The utility assigned to each choice alternative depends on a number of measurable attributes of the alternative itself and the small-scale farmer who is the decision maker (Sigei, 2015). Below is a representation of the model:

$$U^i_j = U^i X^i_j \quad (5)$$

Where, U^i is the perceived utility, X^i_j is a vector of attributes relative to alternative j , to decision maker i , utility is not known with certainty, and it must be represented in general by a random variable. Probability that the farmer will select alternative j conditional of their choice set I^i will be given by:

$$P^i(j/I^i) = P^i(U^i_j > U^i_k), \forall k \neq j, k \in I^i \quad (6)$$

The perceived utility U^i_j can be expressed as sum of two terms: a systematic utility and a random residual. Systematic utility V^i_j represents the mean of all small-scale farmers having the same choice context as decision maker, i . ε^i_j captures the combined effects of the various factors that introduce uncertainty in choice modeling and it is expressed as:

$$U_j^i = V_j^i + \varepsilon_j^i \forall j \in I^i \quad (7)$$

With $V_j^i = E(U_j^i)$, then $E(V_j^i) = V_j^i$, $var(V_j^i) = 0$ and $E(\varepsilon_j^i) = 0$, $var(U_j^i) = \sigma_{ij}^2$ and this yields,

$$P^i(j | I^i) = \text{Prob}(V_j^i - V_k^i > \varepsilon_k^i - \varepsilon_j^i) \forall k \neq j, k \in I^i \quad (8)$$

Where P^i is the choice probability. Equation 8 gives the probability of farmers selecting alternative j and it suggests that the choice of a given alternative depends on the systematic utilities of all competing alternatives and on the law of joint probability of random residuals ε_j .

Therefore, the small-scale farmer is likely to choose the option that gives a higher utility among the alternatives. The choice of a given market outlet is discrete because it is chosen among other alternatives. Let P_{ij} represents the probability of a choice of any given market outlet by groundnut small-scale farmers, then equation representing this will be:

$$P_{ij} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + \varepsilon \quad (9)$$

Where i takes values (1, 2, 3), each representing choice of market outlet (farm gate = 1, local market = 2, urban market = 3). X_i are factors affecting choice of a market outlet, β are parameters to be estimated and ε is randomised error. With j alternatives, probability of choosing outlet j is given by:

$$\text{prob}(Y_i = j) = e^{z_j} / \sum_{k=0}^j e^{z_k} \quad (10)$$

Where z_j is choice and z_k is alternative that could be chosen. The model estimates are used to determine the probability of choice of a market outlet given j factors that affect the choice X_i . With a number of alternatives log odds ratio is computed as:

$$\ln(P_{ij}/P_{ik}) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + e_i \quad (11)$$

- ❖ P_{ij} and P_{ik} = Probabilities that a small-scale farmer will choose a given outlet and alternative outlet respectively.
- ❖ $\ln(P_{ij}/P_{ik})$ = Natural log of probability of choice j relative to probability choice k .
- ❖ α = Constant

- ❖ β = Matrix of parameters that reflect the impact of changes in X on probability of choosing a given outlet
- ❖ e = Error term that is independent and normally distributed with a mean zero.

The conditional probability of the i^{th} small-scale farmer being in the three alternative categories ($j = 1, 2, 3$) are expressed as functions of the estimated B_n and X_n :

$$P(j=1) = \frac{1}{1 + \exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki}) + \exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})} \quad (12)$$

$$P(j=2) = \frac{\exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki})}{1 + \exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki}) + \exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})} \quad (13)$$

$$P(j=3) = \frac{\exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})}{1 + \exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki}) + \exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})} \quad (14)$$

The parameter estimates of the Multinomial Logit model provide only the direction of the effect of the independent variable on the dependent (response) variable but do not represent the actual magnitude of either change or probabilities. The marginal effects or marginal probabilities are functions of the probability itself and measure the expected change in the probability of a particular choice being made with respect to unit change in an independent variable from mean (Greene, 2000). Marginal effects of the attributes on choice are determined by getting the differential of probability of a choice and it is given by:

$$(\delta) = \partial p_i / \partial X_i = P_i (\beta - \sum_{k=0}^j P_k \beta_k) = P_i (\beta_j - \beta) \quad (15)$$

In this study, the Multinomial Logit Regression model will be expressed as:

$$\ln(P_j/P_1) = \beta_{0j} + \beta_{1j} X_{1i} + \beta_{2j} X_{2i} + \dots + \beta_{kj} X_{ki} + U_{ij} \quad (16)$$

Table 3.3: Description of variables (Multinomial Logit model)

		Variables	Description	Units of Measurement
Dependent Variable				
MKTO		Household choice of groundnut market outlet	Farm gate = 1, Local market = 2, Urban market = 3	Trichotomies
Independent Variables				
X ₁	AGE	Age	Age of small-scale groundnut farmers	Years
X ₂	GNDR	Gender	1 if the farmer is male, 0 otherwise	Dummy
X ₃	MSTS	Marital Status	1 if the farmer is married, 0 otherwise	Dummy
X ₄	EDUC	Level of Education	Years of schooling	Years
X ₅	HSZE	Household size	Number of people in the same household	Number
X ₆	DTMK	Distance to Market	Distance farmers travel to the market	Kilometers (Km)
X ₇	LSZE	Land size	Amount of land at farmer disposal	Hectares (Ha)
X ₈	VOWN	Vehicle Ownership	1 if farmer owns vehicle, 0 otherwise	Dummy
X ₉	EXTE	Access to extension	1 if farmer has access to extension services, 0 otherwise	Dummy
X ₁₀	GYLD	Groundnut Yield	Quantity of groundnuts produced by the farmers	Kilograms (Kg)
X ₁₁	OCCU	Occupation	1 if a farmer is a pensioner, 0 otherwise	Dummy
X ₁₂	CRED	Access to credit	1 if a farmer has access to credit, 0 otherwise	Dummy
X ₁₃	MKTG	Marketing groups in	1 if famers market in group, 0 otherwise	Dummy

Multinomial Logit Model is given below:

Household choice of market outlet = $\beta_0 + \beta_1$ (Age) + β_2 (Gender) + β_3 (Marital status) + β_4 (Education Level) + β_5 (Household size) + β_6 (Distance to market) + β_7 (Land size) + β_8 (Vehicle ownership) + β_9 (Access to extension) + β_{10} (Groundnut yield) + β_{11} (Occupation) + β_{12} (Access to credit) + β_{13} (Marketing in groups).

3.7. Conclusion

The chapter introduced where the study was conducted. The study area was described in detail to indicate its location and population size. The study employed purposive sampling technique to choose the relevant farmers to participate. 110 small-scale farmers were selected using probability proportionate to sample size. The small-scale farmers were interviewed using a structured questionnaire that had both closed and open-ended questions. The data collected was analysed using SPSS version 25.0 and STATA version 12. Both the logistic regression and multinomial logit model were employed to address the two objectives.

CHAPTER 4: RESULTS AND DISCUSSION

4.1. Introduction

The results of the study are discussed in this chapter. These includes a discussion of descriptive statistics, logistic regression and multinomial logit model results. Descriptive statistics was employed to address the first objective of the study; to identify and describe the socio-economic characteristics of small-scale groundnut farmers. The results are presented in the form of tables, pie chart and figures. This chapter further deals with the Logistic regression and Multinomial logit models which were employed to address the second and third objectives; to analyse the determinants of commercialization and analyse the factors affecting the choice of market outlet among the small-scale groundnut farmers.

4.2. Descriptive statistics

Table 4.1: Frequency table

	Minimum	Maximum	Mean	Std. Deviation	Measurement
Quantity of groundnuts produced by the farmers	10	100	42.96	25.443	Kilogram
Age of small-scale groundnut farmers	23	85	50.47	13.684	Years
Years of schooling	0	18	11.99	3.915	Years
Number of people in the same household	2	13	5.51	1.954	Number
Distance farmers travel to the market	1	58	27.75	12.559	Kilometers
Amount of land at farmer disposal	0.50	2.50	1.16	0.602	Hectare

Source: Survey data (Nov – Dec 2019)

Table 4.1 indicates the descriptive statistics of the small-scale groundnut farmers in the respective villages; Ga-Maja, Ga-Mphahlele and Moletjie. The three regions fall under Polokwane, which is the capital of Capricorn. The regions share an annual rainfall of 389 mm and most occur during summer. The table shows that the youngest small-scale farmer is 23 years with 85 being the oldest. The average age of the small-scale farmers is 50, this means that the minority of the small-scale farmers are youth. The “number of people in the same household” refers to the number of individuals living in the same house consuming the same meal. The maximum number was 13 individuals per house and minimum of two individuals per house. The average household size in the respective villages is 5.51.

In this study, the “quantity of groundnuts” refers to the amount that the small-scale farmers produce and is measured in kilograms. As such, it was found that the small-scale farmers produced the maximum of 100kg with a minimum of 10kg per production cycle.

The variable “years of schooling” refers to the number of years that the small-scale farmer attended school. The minimum is zero meaning that the small-scale farmer never attended school and the maximum number is 18, and this could mean that the small-scale farmer has a tertiary qualification.

Table 4.1 further outlines the distance that the small-scale farmers travel to the market. The minimum distance the small-scale farmers travel to the market is 1km, this includes those who sell the groundnuts at local markets and they prefer not to travel distances with their products. The farthest the small-scale farmers travel to sell their groundnuts is 58km. This is because they want to maximize their profit by selling at an urban area. Most sell at Polokwane CBD where the market for vendors is huge.

Lastly, the table highlights the amount of land that the small-scale farmers possess. This refers to the amount of land that the small-scale farmers use to produce groundnut. Some of the small-scale farmers produce on plots of less than a hectare whilst others produce on approximately 2 hectares. However, no small-scale farmers under this study produces groundnut solely, but mixes it mainly with maize and other vegetables.

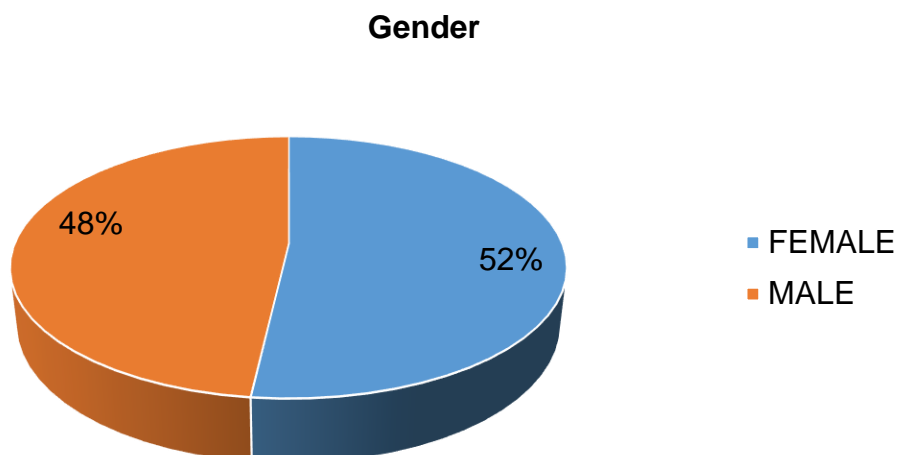


Figure 4.1: Gender of the small-scale farmer

Source: Survey data (Nov – Dec 2019)

Figure 4.1 shows the results of the small-scale farmer in terms of gender. The results indicate that 48% of males participated in the study. The females that participated are at 52%, out of the 110 sampled small-scale groundnut farmers, female's participation was greater than male participation in commercialization. Evidence from Rangoato (2018) shows that female representation exceeded that of male in market access and productivity. This might be because females are more engaged with other activities or undertaking household tasks. Furthermore, StatsSA (2011) indicates that the general population of females is greater than males in South Africa. This is further supported by the study conducted by Hlomendlini (2015), who found that females are the main participant in market access than males. However, these findings are in contrast with Reyes *et al.* (2012), who found that households that are headed by males were more likely to participate in the market compared to the females-headed households.

Small-scale farmers' occupation

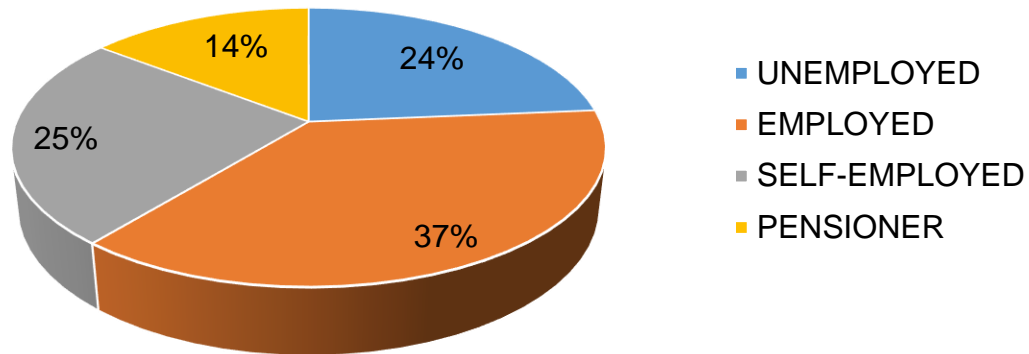


Figure 4.2: Occupation of the small-scale farmer

Source: Survey data (Nov – Dec 2019)

The results of small-scale groundnut farmer's occupation are shown in Figure 4.2. The small-scale farmer's occupation was categorised into unemployed, employed, self-employed and pensioner. Categories such as temporary and contract employment are reflected within employed, as they are subjected to conditions. It is indicated that the majority of the small-scale farmers were employed at 37%, followed by self-employed at 25%. Consequently, unemployment and pensioners followed at 24% and 14%, respectively.

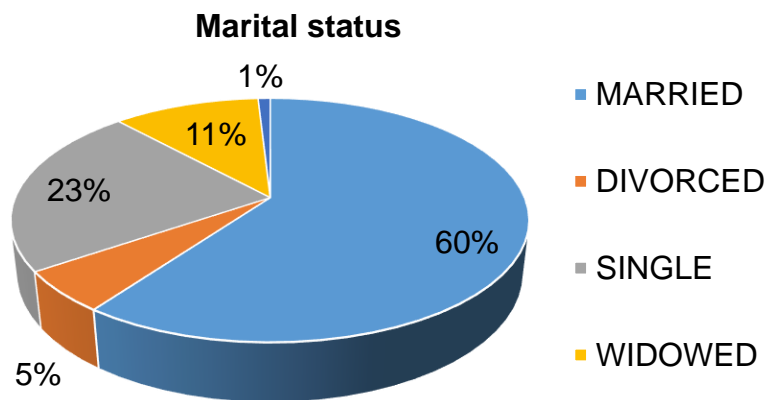


Figure 4.3: Marital status of the small-scale farmer

Source: Survey data (Nov – Dec 2019)

The marital status of the small-scale farmers is categorised into five categories; married, divorced, single, widowed and living together. Figure 4.3 represents the marital status of the small-scale groundnut farmers. The figure indicates that 60% of the small-scale farmers were married, 23% single, 11% widowed, 5% divorced and lastly 1% living together. The study reported that some of the small-scale groundnut farmers were living together, however, not married. The implication of this finding is that most of the small-scale farmers were married. Therefore, they tended to make use of family members as labourers and this may increase their productivity and increase marketability of the groundnut and to reduce their labour costs. Similar results were found in a market participation study conducted by Barret (2008).

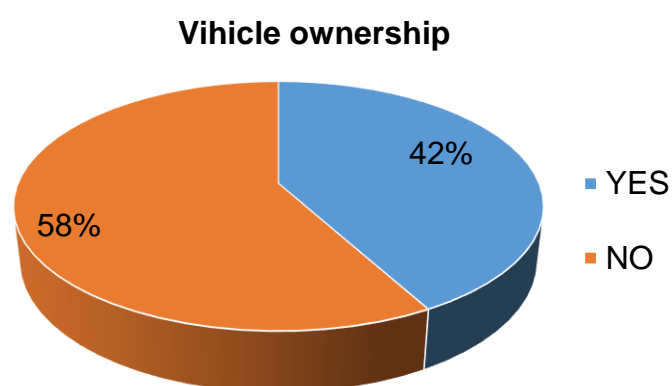


Figure 4.4: Vehicle ownership

Source: Survey data (Nov – Dec 2019)

The above figure indicates the percentage of small-scale farmers who own vehicles. As indicated in Figure 4.4, 58% of the small-scale farmers did not own vehicles whilst the remaining 42% did. Vehicle ownership is important in the field of agriculture as one needs to transport produce easily and to a better market within a short period. Lundy *et al.* (2002) indicate that small-scale vehicle ownership is significant to the production and sales of agricultural produce. This may be because of the perishability of agricultural produce. Therefore, the groundnuts require proper transportation and storage so that they can be sold at a good quality. The quality will increase the competitive advantage of the small-scale farmer.

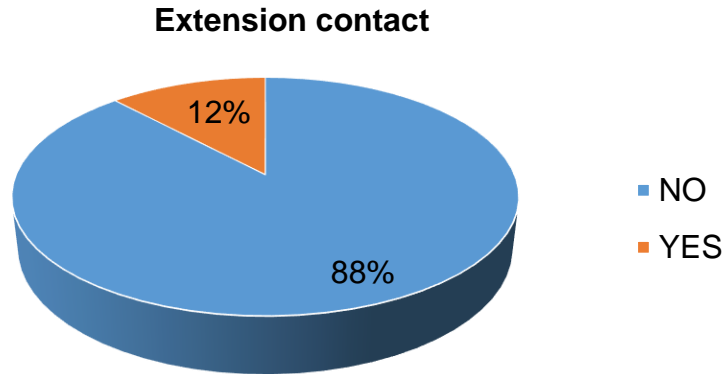


Figure 4.5: Extension contact

Source: Survey data (Nov – Dec 2019)

The level of extension contact is reflected in Figure 4.5. Extension officers work closely with the farmers in order to help them make better decision to increase their production and to transfer information related to agricultural production. It is not surprising that the majority did not have extension contact as they were small-scale farmers. The reason could be that the agents mainly visited emerging and commercialized farmers and that most of the small-scale farmers are scattered across different regions and some practiced backyard agriculture. The results indicate that only 12% had at least once received extension contact. However, it was noted that some of the small-scale farmers confused researchers collecting data with extension agents. Extension agents never contacted the majority of the small-scale farmers.

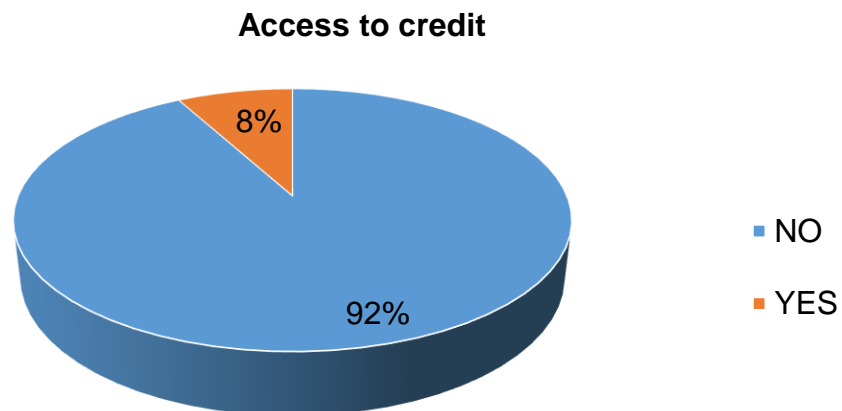


Figure 4.6: Access to credit

Source: Survey data (Nov – Dec 2019)

Figure 4.6 represents the access to credit by the small-scale groundnut farmers. The results indicate that from the sampled small-scale farmers, only 8% received credit. However, the credit was in the form of capital inputs. These capital inputs serves as credit access as they would direct the money intended to buy the inputs to other farming activities. Due to lack of collateral, the security that is needed by most lending entities, 92% of the small-scale famers did not receive credit. This is the same as extension contact, majority of these services were focused on emerging and commercial farmers. Ochieng *et al.* (2015) find access to credit as one of the significant variables that leads to increased productivity.

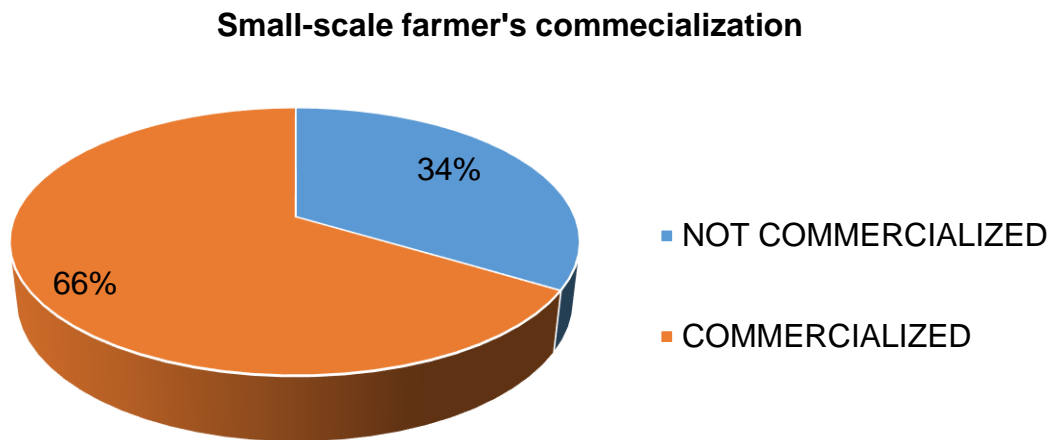


Figure 4.7: Small-scale farmer’s commercialization

Source: Survey data (Nov – Dec 2019)

The state of commercialization by the small-scale farmers in the study areas is shown in Figure 4.7. A report by the World Bank (2007) stipulates that producers who sell more than 50% of their agricultural production on the market is market-orientated. It is highlighted in the above diagram that the majority at 66% are commercialized. That is, they sell more than 50% of groundnuts they produce. The groundnuts can be sold at either farm gate, local market or urban market. The results further showed that the proportion of the small-scale farmers that were unable to commercialize constituted 34%. This is directly correlated with the output and distance to the market. However, the determinants of groundnut commercialization are discussed later in this study.

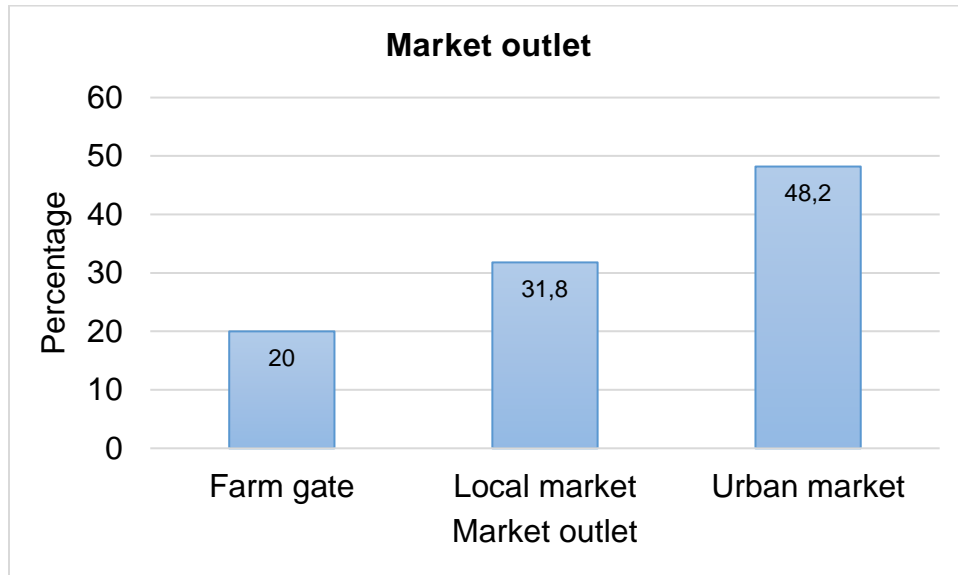


Figure 4.8: Small-scale farmer’s choice of market outlet

Source: Survey data (Nov – Dec 2019)

Figure 4.8 shows the choices of market outlet by the small-scale groundnut farmers from the respective villages. The results indicate that the majority at 48% sold the groundnuts at urban market. This is due to the increased probability of profit maximisation since the market at urban areas is relatively large as compared to local and farm gate. In addition, the urban market is constituted of various consumers, hence, competition is much higher at the urban market. The results in Figure 4.8 shows that 32% of the small-scale farmers sold at local market. This included local taxi ranks and spazas. The small-scale that sold at farm-gate constituted only 20%.

4.3. Results of the factors affecting commercialization of small-scale groundnut farmers

Agricultural productivity and income generated from farming activity is influenced by various factors (Mathenge *et al.*, 2015). These include a combination of labour and other significant variables in the production as well as other farming activities. This model assesses the significance of the factors responsible and that are relevant when it comes to explaining variation of the dependent variable.

Table 4.2: Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	15.712	12	0.002
Block	15.712	12	0.002
Model	15.712	12	0.002

Source: Survey data (Nov – Dec 2019)

The model chi-square value is the difference between the null model and the current (full) (chi-square values =15.712). Taking into consideration the P-value (Sig value) in the above table, the null hypothesis is rejected since the value is less than 0.05. This implies that the addition of the independent variables improves the predictive power of the model. The block and the step values are equal to the model values since all the values were entered at the same time (Muchabaiwa, 2013).

Table 4.3: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	65.468	0.642	0.661

Source: Survey data (Nov – Dec 2019)

The Cox and Snell R square is an attempt to provide a logistic regression equivalent to the coefficients of determination in multiple regression. Hence, it is often called the pseudo-R statistic. The model results indicated the pseudo-R statistic to be 64%, and this implies a good fit of the model. This further implies that the chosen model was relevant in analysing the results. The Nagelkerke R square adjusts the Cox and Snell R-square so that it ranges from zero to one. The value increased to 66%. Hosmer and Lemeshow (2000) indicate that these values should be used with caution since they do not explain the amount of variation accounted for by the model as does the R-square in multiple regression.

Table 4.4: Factors affecting commercialization of small-scale groundnut farmers

Variables in the Equation						
	B	S.E.	Wald	t-value	Sig.	Exp(B)
Quantity of groundnuts produced by the farmers	0.479**	0.226	4.480	2.111	0.034	1.614
Age of small-scale groundnut farmers (Years)	0.567**	0.286	3.947	1.982	0.047	1.764
Years of schooling (Years)	1.050*	0.332	8.029	3.163	0.070	1.489
1 if a farmer is a pensioner, 0 otherwise	-0.009	0.019	0.221	0.473	0.638	0.991
1 if the farmer is married, 0 otherwise	0.039	0.117	5.581	0.333	0.918	0.962
1 if the farmer is male, 0 otherwise	-0.202	0.469	0.186	0.430	0.666	0.817
Number of people in the same household (Number)	-0.219**	0.113	3.776	1.938	0.052	0.803
Distance farmers travel to the market (Km)	0.148	0.228	0.420	0.643	0.517	1.159
Amount of land at farmer disposal (Ha)	0.796**	0.364	4.773	2.186	0.029	2.217
1 if farmer owns vehicle, 0 otherwise	1.365***	0.508	7.224	2.687	0.007	3.917
1 if a farmer has access to credit, 0 otherwise	2.130**	0.749	1.483	2.843	0.044	2.350
1 if farmer have access to extension services, 0 otherwise	1.188**	0.496	5.739	2.395	0.017	3.279
Constant	-3.151	2.135	2.180	1	0.140	0.043
a. Variable(s) entered on step 1: Quantity of groundnuts produced by the farmers, Age of small-scale groundnut farmers, Years of schooling, 1 if a farmer is a pensioner, 0						

otherwise, 1 if the farmer is married, 0 otherwise , 1 if the farmer is male, 0 otherwise , Number of people in the same household, Distance farmers travel to the market, Amount of land at farmer disposal, 1 if farmer owns vehicle, 0 otherwise, 1 if a farmer has access to credit, 0 otherwise, 1 if farmer have access to extension services, 0 otherwise.

Note: *, **, *** means statistically significant at 10%, 5% and 1% respectively.

Source: Survey data (Nov – Dec 2019)

The results of the logistic regression model are presented in the above table and were obtained from SPSS version 25. The results indicated that out of 12 variables only eight variables were significant at 10%, 5% and 1% level.

4.3.1. Significant variables

4.3.1.1. Quantity of groundnuts produced by the small-scale farmer

This reflects to the quantity that the small-scale groundnut farmer produced. The quantity was measured in kilograms. The results found that the quantity of groundnut produced was significant at 0.034 at 5% significance level. This is because the more kilograms are produced, the higher the chances that the small-scale farmer sells to the market. The study, *Determinants and welfare outcomes: A Cross-sectional study in Enderta District, Tigray, Ethiopia, M. Sc. thesis, Haramaya University, by Abera (2009)* found that the chances of commercialization increased as the quantity of output increases. However, some produce for subsistence, and they tend to sell the surplus that they could not consume. The variable is positively significant, indicating that a kilogram increase in groundnut produced increases the likelihood of the small-scale farmer to commercialize.

4.3.1.2. Age of the small-scale farmer

This variable reflects how old the small-scale farmer is and it is measured in years. The results show that the variable is positively significant with 0.047 at 5% significance level. This implies that age is directly correlated with commercialization. This is because age and experience have a strong relationship. Therefore, more experienced small-scale farmers tend to be more knowledgeable and aware of the farming system. Thus, an increased unit in the number of years increases the likelihood of the small-scale farmer to commercialize. This result concurs with those of Mahelet (2007) who conducted the

study; Factors affecting commercialization of smallholder farmers in Ethiopia: The case of North Omo Zone, SNNP region. In *Fifth International Conference on the Ethiopian Economy, Addis Ababa*.

4.3.1.3. Educational level of the farmer

This variable is measured in the number of years that the small-scale farmer spent in school. Sigei *et al.*, (2015) identifies the level of education to be one of the most significant variable. According to Bifarin *et al.* (2010) education is a variable that is expected to improve managerial input and lead to better decisions in farming. This is because as the small-scale farmer matures, they tend to make rational decisions based on experience and knowledge that they have obtained throughout their existence. The results in Table 4.4 shows that the educational level of the small-scale groundnut farmer was positively significant. This is highlighted by the p-value of 0.070 at 10% significant level. Therefore, the higher the educational level, the higher the chances of the small-scale farmer to commercialize.

4.3.1.4. Household size of the small-scale farmer

This reflects the total number of individuals in the same house sharing the same meal. The variable was found to be negatively significant with 0.052 p-value at 5%. This implies that an additional household member decreases the likelihood of the small-scale farmer to commercialize. It is argued that large household sizes detract households from market orientation due to its effect on increasing household domestic consumption needs. Enterline (2013) and Agwu *et al.* (2012), found similar results when undertaking studies; *The Impact of Groundnut Production and Marketing Decisions upon Household Food Security among Smallholder Farmers in Sub-Saharan Africa: Does Gender Matter? and Socio-Economic Determinants of Commercialization among Small Holder Farmers in Abia State, Nigeria*.

4.3.1.5. Land size of the small-scale farmer

This refers to the amount of land that the farmer utilised to produce groundnuts. The variable was found to be positively significant with 0.029 p-value at 5% significant level. This means that land size has a positive relationship with commercialization, indicating that a unit increase in hectares is most likely to increase the farmer's level of commercialization. Among others, land is the most important variable in agriculture and the most limited resource. Lininger (2011) indicate that small-scale farmers that produce on relatively less hectares of land produce solely for household consumption. The study *Commercialization of Smallholder Agriculture in Ghana: A Tobit regression analysis* by Martey *et al* (2012) corroborates this results and it indicated that farm size influences the level of agricultural commercialization.

4.3.1.6. Vehicle ownership by the small-scale farmer

The variable was positively significant with 0.007 p-value at 1%. This indicates that the variable has a positive relationship with the dependent variable, meaning that owning a vehicle increased the small-scale farmers' likelihood to commercialize. This made access to the market easy and transportation costs were reduced. Kabitani *et al.* (2016) further discuss, the importance of vehicle ownership in their study (Determinants of Agricultural Commercialization among Smallholder Farmers in Munyati Resettlement Area, Chikomba District, Zimbabwe) and have found it to be positively significant towards agricultural commercialization among smallholder farmer in Munyati area.

4.3.1.7. Access to credit by the small-scale farmer

Access to credit was found to be statistically significant and having a positive relationship with the dependent variable. It was significant with 0.044 p-value at 5% significance level. This implies that small-scale farmers' access to credit increases the likelihood of commercialization. Agwu *et al.* (2012) highlight the importance of access to credit, as one of the major constraints militating against agricultural productivity among farmers, particularly small-scale farmers. According to Martey *et al.* (2012), credit link farmers with modern inputs that directly improves the farmer's productivity. This subsequently induces

the extent of participation in the market as output increases and the degree of commercialization increases.

4.3.1.8. Extension contact by the small-scale farmer

This variable was found to be correlated with the dependent variable with 0.017 p-value at 5% significance level. This implies that the small-scale farmers with extension contact are more likely to commercialize as compared to those who are not in contact with the agents. This result concurs with the study of Ele *et al.* (2013); Assessing the Extent of Commercialization of Smallholding Farming. Farmers with extension contact have been able to increase their output due to their introduction to innovative farming.

4.3.2. Insignificant variables

Occupation of the small-scale farmer, gender, distance to the market and the marital status were found to be insignificant in this study. However, they are among the relevant variables in analysing the determinants of commercialization in agriculture. The findings, contrary to the study of Chilundika (2011) “Market participation of bean smallholder farmers in Zambia: a gender based approach” were found to be insignificant. Distance to the market is one of the relevant factors when explaining the degree of commercialization, this is attested by studies (Barrett 2008; Rios *et al.*, 2008 and Omiti *et al.*, 2009). However, in this study, distance was found to be insignificant.

4.4. Results of factors influencing the choice of groundnut market outlets

The results of the Multinomial regression model are discussed in this section. The model was employed to address the third objective; to analyze the factors influencing the choice of groundnut market outlet among small-scale farmers. The market choices are farm gate, local market, and urban market. Urban market is chosen as a base category or reference variable since the majority of the small-scale farmers choose to sell at the urban market as compared to local and farm gate. The variables used in the analysis are age, gender, marital status, educational level, household size, distance to market, land size, vehicle ownership, access to extension, groundnut yield, occupation, access to credit and marketing groups. Table 4.6 presents the results of the Multinomial Logit model. The pseudo-R square was 0.61 indicating that the explanatory variable explained about 61%

of the variable in the choice of market outlets. The estimated Deviance χ^2 of 192.36 and Pearson χ^2 of 161.11 with 180 degrees of freedom indicates statistical significance. The overall classification accuracy of the model is at 79%, local market at 69%, farm gate at 31.1% and urban market at 77%, respectively.

Table 4.5: Diagnostics to assess the degree of multicollinearity of sampled small-scale farmers under the Capricorn districts of Limpopo Province, South Africa 2019 (n=110)

Explanatory variables	Collinearity Statistics	
	VIF	1/VIF
Age	2.40	0.42
Gender	2.31	0.43
Marital Status	2.90	0.34
Level of Education	2.88	0.35
Household size	1.34	0.75
Distance to Market	2.17	0.46
Land size	1.65	0.61
Vehicle Ownership	1.20	0.83
Access to extension	1.65	0.60
Groundnut Yield	2.71	0.37
Occupation	1.17	0.85
Access to credit	1.57	0.64
Marketing in groups	1.60	0.63
Mean VIF	1.96	0.56

Source: Survey data (Nov – Dec 2019)

To test for multicollinearity, the variance inflation factor (VIF) was conducted for the above variables. The baseline is that if the variable exceeds 10 then there is a multicollinearity problem. The VIFs for all variables were less than 10 with an average of 1.96 with an inverse variance inflation factor of 0.56. This shows that the above econometric problem did not exist among the variables. The degree of multicollinearity was all assessed using IBM SPSS Version 25.0 package software.

4.4.1. Factors affecting the choice of market outlet among the small-scale groundnut farmers.

Table 4.6: Multinomial Logit Model Results

Dependent variable	Ln(P ₂ /P ₁) Local market vs urban market			Ln(P ₃ /P ₁) Farm gate vs urban market		
	Coefficient (Std. error)	Marginal effects		Coefficient (Std. error)	Marginal effects	
Contrast 1		Contrast 2	dy/dx		P-value	dy/dx
CONSTANT	4.457*** (1.474)		0.0001	4.1555*** (1.124)		0.0001
Age	0.712*** (0.224)	0.003	0.002	0.608** (0.267)	0.031	0.022
Gender	0.450 (0.418)	-0.037	0.828	0.709** (0.3105)	0.069	0.015
Educational level	5.238*** (1.502)	-0.041	0.004	0.614* (0.3265)	-0.046	0.080
Marital status	12.296 (11.378)	0.0030	0.470	76.9535** (19.494)	-0.025	0.002
Household size	1.179** (0.563)	0.014	0.021	0.771*** (0.3145)	-0.019	0.041
Distance to the market	2.565 (2.491)	-0.009	0.524	4.316*** (1.1485)	0.511	0.001
Land size	0.251 (0.175)	0.066	0.231	3.0355*** (0.597)	-0.433	0.000
Vehicle ownership	0.396 (0.428)	-0.048	0.222	-0.9015** (0.4385)	0.032	0.052
Extension contact	-0.556 (0.506)	0.0003	0.107	0.0805* (0.0485)	0.002	0.083
Groundnut yield	59.593** (26.637)	0.047	0.017	-0.8215 (0.533)	-0.014	0.321
Occupation	0.028 (0.191)	-0.006	0.935	-0.231* (0.1265)	0.291	0.071
Access to credit	7.471*** (2.066)	-0.312	0.004	6.0355*** (1.097)	-0.403	0.001

Marketing in groups	1.099 (0.752)	-0.505	0.212	2.4785** (1.4285)	-0.115	0.033
Diagnostics Base category = Urban Market(P ₁) Number of observations= 110 Wald χ^2 statistic = 73.92*** Log likelihood= -90.40 Pseudo-R ² = 0.61 Deviance χ^2 (180) = 192.36 and Pearson χ^2 (180) = 161.11 (significant level=1.000) Classification accuracy (correctly predicted) Local Market = 69%; Farm gate = 31.1%; Urban market = 77%; overall model = 79% dy/dx is for discrete change of dummy variable from 0 to 1 Standard errors are in parentheses Notes:*, **, *** means statistically significant at the 10%, 5% and 1% levels, respectively						

Source: Survey data (Nov – Dec 2019)

4.5. Significant variables

The results in Table 4.6 represent the relationship between the explanatory variables and the dependent variables. The following variables influenced the choice of market outlet among the small-scale farmers; age, educational level, household size, groundnut yield, distance to the market, access to credit, marital status, vehicle ownership, gender, extension contact, land size, occupation and market groups.

4.5.1. Age of the small-scale-farmer

This variable represents the number of years that the small-scale farmer has been alive. In this study, this variable is measured in years. It was included in the analysis to determine what type of market outlet different age groups prefer. The estimated results in Table 4.6 indicate that the sign coefficient parameter was positive in both contrast at 0.712 and 0.608. This implies that there was a positive relationship between the age of the small-scale farmers and the choice of market outlet. Therefore, there is enough evidence to suggest that the variable influenced the choice of market outlet among the sampled small-scale farmers. The results of the variable Age of the small-scale farmer in Table 4.6 shows that, a unit increase in age (number of years of the small-scale farmers) increases the probability of the small-scale farmer to sell at local market by 0.3% and at farm-gate at 0.31% relative to the base category. This is in contrary to the findings of

Dessie (2018) who found the age of the household head to have a negative relationship with rural assembler wheat markets. The older the household head, the harder it is for them to trust prices given by local trader, thus, instead, prefers urban traders. Determinants of marketing channels among smallholder cattle farmers in Namibia by Shiimi et al. (2012) indicate that the age of the farmer is positively associated with the decision to sell or not to sell through the formal market.

4.5.2. Gender of the small-scale farmer

Table 4.6 shows that gender was found to be a significant variable in the analysis. It had a positive relationship with the choice of market outlet, as the sign in both contrasts is positive at 0.450 and 0.709. Girma and Abebaw (2012) analysed the determinants of livestock farmers' choice of marketing channels and found that gender of the household head determined the choice of market channels. However, the variable in this study was only statistically significant in the second contrast at 0.015 with a 5% significance level. This indicates that there was insufficient evidence in the first contrast to suggest that gender influenced the choice of market outlet since it was statistically insignificant. A unit increase in the number of male-headed increases the likelihood to sell the groundnuts at farm gate by 0.69% as compared to female-headed households relative to urban market. This means that females are faced with gender specific constraints that generally have minimal effects on males (Wosene *et al.*, 2018).

4.5.3. Educational level of the small-scale farmer

The model results in Table 4.6 indicates that the educational level of the small-scale farmer was statistically significant in both contrasts. This implies that the small-scale farmer's level of education had a significant influence on the choice of market outlet. The coefficient sign was positive and thus indicating a positive relationship between the educational level and the choice of market outlet. The variable was found to be significant at 1% and 10% significance levels. This implies that an increase in the level of education increased the probability of the small-scale farmer to sell at local market and farm gate by 0.47%% and 0.46% relative to the base category. The variable being statistically significant concur with the notion that the higher educational level achieved by the farmer, the higher the chances of adopting a new marketing channel due to new knowledge

exposure. Gani and Adeoti (2011) find that farmers' market participation decision is positively influenced by the level of education.

4.5.4. Marital status of the small-scale farmer

This variable was included in the analysis to determine the extent that the marital status of the small-scale farmer had on the choice of market outlet. The variable was found to be statistically significant in the second contrast with coefficient 76.95 with p-value 0.002 at 5% significant level. This implies that the variable had a positive relationship with the choice of market outlet. A unit increase in the number of married household heads increased the likelihood of the small-scale farmer to sell at farm gate by 0.25% relative to the reference category. The results concur with those of Chirwa (2009) who found marital status to have a significant influence in market outlet choice.

4.5.5. Household size of the small-scale farmer

This variable represents the total number of individuals living in the same household. It was included in the analysis to identify how small or large family members affected the choice of market outlet. The results in Table 4.6 show that the household size of the small-scale farmer has a positive relationship with the dependent variable. This means that household size significantly influenced the choice of market outlet by the small-scale farmer. This can be indicated by the positive coefficient values (1.179 and 0.771) in both contrasts. A positive relationship and marginal effect indicated that an increase in the number of individuals increased the probability of the small-scale farmer to sell at local market by 0.14% and with a decrease of 0.19% at farm gate relative to urban market. The negative sign in the marginal effect of farm gate suggests that as the total number of individuals living in the same household increased, extreme measures were put in place to increase profits. This means that the small-scale farmers' chances of selling at farm gate diminished as it would be best for them to widen their markets and sell where they could make profit.

4.5.6. Distance to market travelled by the small-scale farmer

This variable reflects the distance that the small-scale farmer travelled to sell the groundnuts and it is measured in kilometers. With reference to Table 4.6, it is indicated that the variable had a positive relationship with the choice of market outlet. However, it was only statistically significant in the second contrast with p-value of 0.001 at 1% significant level. This implies that a unit increase in the distance-travelled increased the likelihood of the small-scale farmer to sell at farm gate by 51%. This is because the small-scale farmer would want to decrease transportation cost by selling close to production. However, Wosene *et al.* (2018) found that the distance to market had a negative relationship with the dependent variable as the study explains that households whose residences are far from the nearest market were less likely to sell to consumer market outlet and more likely to sell to other market outlets like a wholesaler and local collector market outlet.

4.5.7. Land size of the small-scale farmer

This refers to the area that the small-scale farmer used to produce groundnuts and it is one of the most important and scarce resource in the agricultural sector. It is measured in hectares. The variable was found to have a positive relationship with the choice of market outlet. Table 4.6 indicates that land size was positive in both contrasts with 0.251 and 3.035 beta coefficients. However, it was statistically significant only in the second contrast with p value of 0.000 at 1% significant level. This implies that a unit increase in land size decreased the likelihood of the small-scale farmer to sell at farm gate by 43%, thus increasing the probability for the small-scale farmers to sell more at urban market. This suggests that the larger the land size, the more produce that the small-scale farmer will produce. Thus, it would be advantageous to the small-scale farmer to sell at the urban market. The findings concur with those of Dessie (2018) who stipulated that consumers did not purchase large amounts of wheat directly from farmers but rather at the retailers.

4.5.8. Vehicle ownership by the small-scale farmer

Owning a transport vehicle is of significance in agriculture, hence the addition of this variable in the analysis. Vehicle ownership helps in reducing the long distance constraints and aids in offering the greater depth in marketing choices (Sigei, 2014). Table 4.6 indicates that vehicle ownership has both a positive and a negative relationship with the choice of market outlet. Most of the small-scale groundnut farmers used van/bakkie to carry their produce to the markets. However, it was statistically significant only in contrast 2. This implies that an increase in the number of vehicles owned by the small-scale farmer increased the likelihood of the small-scale farmer to sell at farm gate by 0.32% relative to the base category. Chalwe (2011) states that the availability of transport increases the probability of transporting produce to private traders in the market. Further, as explained by Lapar *et al.* (2009) farmers' own vehicles allow them to access marketing centres located far off at a lower cost and within a shorter period as compared to their colleagues who had no transport means.

4.5.9. Extension contact by the small-scale farmer

This variable refers to the number of times that the extension officers visited the small-scale farmers. These visits offer services that play an important role in empowering farmers with farming techniques, skills and knowledge. Therefore, the variable was included in the analysis to assess its relationship with the choice of market outlet. Table 4.6 shows that this variable had a negative relationship with the depended variable in the first contrast with -0.556 coefficient and positive relationship in the second contrast with 0.080 coefficient. The variable, however, was significant only in the second contrast with p value of 0.083 at 10% significance level. This implies that extension contact increased the likelihood of the small-scale farmer to sell at farm gate by 0.02%. Zeberga (2010) highlights that small-scale farmers who have contact with extension agents are more likely to have knowledge about production, quality, and price of inputs and information on markets and output prices of poultry. Furthermore, Mussema and Dawit (2012) found that extension service had positive and significant influence on market participation and choice of marketing channels.

4.5.10. Groundnut yield produced by the small-scale farmer

This refers to the total amount of groundnut that the small-scale farmer produced in the previous year. It is measured in kilograms. The results show that groundnut yield had a positive and a negative relationship with the choice of market outlet in contrast 1 and 2 with beta coefficients of 59.593 and - 0. 821. It was also found to be statistically significant in contrast 1 only at p-value of 0.017 at 5% significance level. This implies that a kilogram increase in the groundnut produced increased the likelihood of the small-scale farmer to sell at local market by 0.47% relative to urban market. Small-scale farmers who have more yields have more opportunities of selling their produce at the market places than those with the little produce (Sigei, 2014). Honja *et al.* (2017) find that the quantity of mango produced also determined the choice of wholesaler market outlet positively at less than 1% level of significance.

4.5.11. Occupation of the small-scale farmer

Table 4.6 indicates that occupational status of the small-scale farmer has both a positive and a negative relationship with the choice of market outlet. The beta coefficients were found to be 0.028 and -0.231 respectively. The results indicate that the likelihood of small-scale farmers selling at farm gate increased by 29% as compared to urban market. However, this variable was statistically significant at p-value of 0.071 at 10% significance level.

4.5.12. Access to credit by the small-scale farmer

Credit access is significant to every farmer, regardless of resource endowment or land size. This also refers to access to financial support that is needed to finance the farming activities of the small-scale farmer. This justifies the reason behind the addition of this variable in the analysis. Barret (2008) indicates that access to credit is a significant variable that increases the participation of the small-scale farmer in the market. Credit access was found to have a positive relationship with the choice of market outlet. Furthermore, it was found to be statistically significant in both contrast with p-values of 0.004 and 0.001 at 1% respectively. The marginal effects indicate that small-scale

farmers with increased access to credit decreased their likelihood of selling at local and farm gate market by 31% and 40%, respectively. This indicates that access to credit allowed them to sell at urban markets since they could cover transaction costs.

4.5.13. Marketing groups

Table 4.6 indicates that the marketing groups had a positive relationship in both contrasts. This is indicated by the beta coefficient values of 1.099 in contrast 1 and 2.478. It is further highlighted in the table that the variable was statistically significant in contrast 2 with p-value of 0.033 at 5% significance level. This implies that an increased number of small-scale farmers marketing in groups decreased their likelihood of selling at farm gate by 11.5%. Njuki *et al.* (2009) justify the finding by stating that small-scale farmers who market collectively to distance places like urban markets usually incur a lower transaction cost. Furthermore, marketing in groups encourages the small-scale farmers to negotiate prices in the markets. Small-scale farmers who market collectively tend to have the ability to reach farther away markets as they share information among themselves (Jari & Fraser, 2009).

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter summarises the discussion of results of the socio-economic characteristics of small-scale groundnut farmers and the determinants of market outlets in the respective villages. It also summarises the empirical results of the Descriptive statistics, Logistic regression model and Multinomial model. Furthermore, policy recommendations are discussed in this chapter in an effort to enhance the choice of market outlets among small-scale groundnut farmers.

5.2. Summary and discussion

The study had three objectives, to identify and describe the socio-economic characteristics, analyse the determinants of commercialization and analyse the factors influencing the choice of market outlet among small-scale farmers in Capricorn District. Furthermore, the study had two hypotheses. Firstly, the study hypothesised that socio-economic factors do not affect commercialization among the small-scale groundnut farmers in Capricorn District. The second hypothesis stated that the socio-economic factors do not affect the choice of market outlet among small-scale groundnut farmers in Capricorn District.

5.3. Descriptive statistics

The socio-economic analysis indicated that 48% of the population were male and 52% female. 37% of the small-scale farmers were employed, 24% unemployed, 14% were found to be pensioners and 25% were self-employed. The sampled small-scale farmers showed a majority, with 60% to be married whereas, 23% were single. Those who were divorced and widowed are at 5% and 11%, respectively and lastly, the study found that only 1% were living together and not married. The minority of the small-scale farmers had extension contact at 12% with the remaining 88% without it. The study further found that only 8% of the small-scale farmers had access to credit as opposed to the 92% that did not. Those who had vehicles constitute 58% and 42% had no vehicles. Moreover, the study found that 66% of the small-scale farmers were commercialized while 34% were

not. Only 20% of the small-scale farmers sold their groundnuts at farm gate, 32% sold at local and the majority, with 48% of the small-scale farmers sold at urban market.

5.4. Logistic regression

Table 4.4 indicated the model results, the model included an analysis of twelve variables wherein only eight were significant. These included the quantity of groundnut produced, occupation of the small-scale farmer, marital status, household size, land size, vehicle ownership, access to credit and extension contact. Age, gender, distance to the market and number of years schooling were found to be insignificant in this study. However, this does not imply that they are not relevant; it means that there is insufficient data to explain the movement of the dependent variables.

5.5. Multinomial logit

This model was employed to analyse the factors affecting the choice of market outlet among the small-scale farmers. The choices were farm-gate, local market and urban market. Urban market served as reference category in the model. The model indicated that the majority of the variables had a positive relationship with the dependent variables. The model indicated its robustness as it was able to explain 61% (Pseudo R²) of the variation in the dependent variables by the explanatory variables.

5.6. Conclusion

The study was conducted in Capricorn district at Ga-Maja, Ga-Mphahlele and Moletjie villages, and employed 110 small-scale groundnut farmers to participate in the study. These small-scale groundnut farmers were interviewed using semi-structured questionnaires to gather the information. The study analysed the determinants of commercialization and the choice of market outlets among small-scale groundnut farmers. The Binary Logistic Regression Model and the Multinomial Logit Model were deployed to analyse the determinants of commercialization and the choice of market outlets. The study had three objectives and two hypotheses. The null hypotheses of the study were that socio-economic factors did not affect commercialization among the small-scale groundnut farmers in Capricorn District, and that socio-economic factors did not affect the choice of market outlet among small-scale groundnut farmers in Capricorn

District. These hypotheses are rejected because, the results from the Binary Logistic Regression Model and Multinomial Logit Model showed that the groundnut produced by the small-scale farmer, the small-scale farmer's occupation, marital status, household size, land size, vehicle ownership, access to credit and extension contact significantly influenced the commercialization and the choice of market outlet of the small-scale groundnut farmers. The significance of the variables was determined using the Logistic Regression Model and the Multinomial Logit Model. The results of the models were obtained using the SPSS version 25 and STATA.

5.7. Recommendations

One of the main objectives of conducting the study was to generate new findings and advise where capable, based on the findings. This section will discuss some of the suggested recommendations that will directly and indirectly influence the small-scale farmers to improve on their groundnut production. These will serve as guidelines to what market to choose based on the level or resource endowment. The aim is to make the small-scale farmers aware of the determinants of commercialization, benefits and costs of commercialization, as well as the type of markets and the necessary information of how to penetrate the market. The recommendations will focus mainly on factors that were included in this study.

The majority of the small-scale farmers did not have access to extension officers. Thus, it is recommended that the government in collaboration with Universities and Agricultural colleges initiate an extension programme that will focus on small-scale farmers, rather than emerging and commercial farmers. This will enable the small-scale farmers to get access to information on market, production, price and other agricultural related activities. Hence, small-scale farmers will be given the opportunity to expand and extend their degree of commercialization.

The government and other policy makers should also increase the marketing information and abilities of groundnut farmers through channels like mass media, and other means of capacity building.

The study also highlighted that a minority of the small-scale farmers had access to credit. Credit like other factors is significant, so significant that it can be deemed the most important factor in agriculture as well as in the industrial sector. Credit allows the small-scale farmers to purchase resource sufficient to increase production. Agricultural financial services require collateral from the farmers, and this is a drawback since the small-scale farmer do not have it. Hence, it is recommended that, provision of funds be awarded not due to the small-scale farmer having collateral but due to the viability of business.

The Department of Agriculture should visit areas where farmers produce the same type of crops and offer them incentives to pool their resources and market their produce collectively. This will improve the bargaining position of the small-scale farmers as well as a means of lowering transaction costs.

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APPENDIX: QUESTIONNAIRE

Questionnaire ID.....



DEPARTMENT OF AGRICULTURAL ECONOMICS AND ANIMAL PRODUCTION

RESEARCH TITLE: DETERMINANTS OF COMMERCIALIZATION AND THE CHOICE OF MARKET OUTLETS AMONG SMALL-SCALE GROUNDNUT FARMERS IN CAPRICORN DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA

The aim of the research is to analyse the determinants of commercialization and choice of market outlets among small-scale groundnut farmers in Capricorn district, Limpopo Province, South Africa. This questionnaire is designed to gather information from the small-scale groundnut farmers who voluntarily agree to participate. The information provided will be used only for the purposes of this research and will be treated strictly confidentially, with no incentives and mention of names in the analysis. Your cooperation will be highly appreciated. Please indicate with an X if you agree to participate and by signing below;

I agree to complete the questionnaire and do so in a voluntary manner. I understand that my responses will be kept confidential. _____

Signature _____ Date _____

Researcher: Mathobela Sakkie Malesela

Name of Enumerator :

Village/Municipality :

Date of Interview :

Contact details :

SECTION 1: SOCIO- ECONOMIC CHARACTERISTICS

Household member (Name and initials)	Relation to household head	Marital status	Gender	Age	Highest level of education	Employment status

Key: Please use the codes in the below table to answer the table above

Relation with the household head	Marital status	Highest level of education	Employment status
1-Father	1-Married	1-Did not attend school	1-Unemployed
2-Mother	2-Divorced	2-Primary level	2-Permanently employed
3-Daughter	3-Single	3-Secondary level	3-Temporarily employed
4-Son	4-Widowed	4-Tertiary level	4-Contract employment
5-Son -in law	5-Living together	5-Did not finish (Primary/secondary/ tertiary)	Self employed
6-Daughter -in - law			
7-Other (specify)			

How many years did the farmer go to school?.....

Source of income

Crop production	Off-farm income	Employment	Social grant	Pension	Other (Specify)
1	2	3	4	5	6

What is the level of income (R) per month?

< 1000	1000 – 10 000	10 000 – 15 000	15 000 – 20 000	>20 000
1	2	3	4	5

What is the total household income.....?

How many people are in your household, living together?

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SECTION 2: GROUNDNUT PRODUCTION

How much land do you have?Ha

How much of the land is used in the production of groundnuts.....Ha?

Do you own land which you use for groundnut production?

Yes	No

If no, how did you acquire the land that you are farming on?

.....

What do you use to plough?

Hire tractor	Own tractor	Hire plough and livestock	Own plough and livestock	Hoe
1	2	3	4	5

If you hire a tractor, how much does it cost per ha?

.....

How much groundnut did you produce in the previous year..... (Kg)

How much did you consume..... (Kg)

Do you hire labourers for farming?

Yes	No

What problems do you face with growing groundnut in this area?

Drought	Difficult to acquire inputs	Pests	Soil fertility	Labour shortage	Theft	Other(Specify)
1	2	3	4	5	6	7

Other.....

Do you have contact with an extension officer?

Yes	No

If yes, how many times do they contact you?.....

Do you have access to prices of the groundnuts input suppliers' information?

Yes	No

If yes, source of information on groundnut prices.....

Source of information on input supplier and their prices.....

Do you belong to any farmer's organisation?

Yes	No

If yes, which organisation do you belong to?

.....

GROUNDNUT MARKETING

Do you sell the groundnut you produce?

Yes	No

How much groundnut did you produce in the previous season (kgs)

How much groundnut did you sell per kg.....

Do you perform price surveys, before selling?

Yes	No

Which markets do you usually use for selling the groundnut produced?

Market	Reason
Formal market	
Informal market	
Subsistence (Not selling)	

What type of market do you sell the groundnut?

Market		Reason
Farm gate	1	
Local market	2	
Urban market	3	

Do you have contractual agreements or a guaranteed/ ready market (formal or informal) with any agribusiness outlet e.g. schools, supermarkets etc.?

Yes	No

Do you have regular customers who always buy from you?

Yes	No

Do you have your own transport?

Yes	No

Before selling your produce what value adding activities do you perform?

Activity	Tick	Reason
Washing		
Packaging		
Other (Specify)		

Other.....

Do you have access to market information?

Yes	No

Do you receive market information prior to sale?

Yes	No

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SECTION 3: AGRICULTURAL WATER ACCESS

Water source

	Which among these do you use?	What is the main use of this water?	Distance from water source (km)?
Well/bore holes			
River			
Dam			
Public water			
Rainwater			

Which of these types of farming do you practice?

Rain fed farming	Irrigated farming	Both
1	2	3

Thank you