MARKET PARTICIPATION OF SMALLHOLDER SUNFLOWER FARMERS IN NORTH WEST PROVINCE, SOUTH AFRICA

By

Ejovi Akpojevwe Abafe

Submitted in accordance with the requirements
for the degree

Master of Science in Agriculture

In the

COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

DEPARTMENT OF AGRICULTURE AND ANIMAL HEALTH

at the

UNIVERSITY OF SOUTH AFRICA
FLORIDA CAMPUS

SUPERVISOR: DR. S.S TEKANA
CO-SUPERVISOR: DR. O.S ODUNIYI

2021

DEDICATION

This dissertation is dedicated to my beloved parents, Chief Ighojabor Benneth Abafe and Lady Margaret Abafe.

DECLARATION

I, Ejovi Akpojevwe Abafe hereby declare that the dissertation, with the title: "Market participation of smallholder sunflower farmers in Ngaka Modiri Molema District in North West Province, South Africa" is my own work and has not been previously submitted by me for a degree at this or any other institution.

I declare that the dissertation does not contain any written work presented by other persons whether written, pictures, graphs or data or any other information without acknowledging the source.

I declare that where words from a written source have been used, the words have been paraphrased and referenced and where exact words from a source have been used, the words have been placed inside quotation marks and referenced.

I declare that I have not copied and pasted any information from the Internet, without specifically acknowledging the source and have inserted appropriate references to these sources in the reference section of the dissertation or thesis.

I declare that during my study I adhered to the Research Ethics Policy of the University of South Africa, received ethics approval for the duration of my study before the commencement of data gathering and have not acted outside the approval conditions.

I declare that the content of my dissertation/thesis has been submitted through an electronic plagiarism detection program before the final submission for examination.

Student signature:

Date: 17/01/2021

ACKNOWLEDGEMENTS

No effort and progress over time are without root somewhere, this dissertation is not exempted. Without the amazing supports of the following people, this research would not have been possible:

Firstly, sincere appreciation goes to my amiable supervisor Dr. Sylvia Sibongile Tekana for her amazing support and guidance all through this journey. My special and greatest gratitude also goes to my always helpful co-supervisor Dr. Samuel Oduniyi, whose been with me every step of the way.

To the College of Agriculture and Environment Science of Unisa, especially professor Micheal Antwi, who has given me the medium to experience this academic development, without you I would not have been admitted. Thank you so much.

My heartfelt thanks also go to all the respondents, enumerators, extension officers (Matshidiso Tjekane, Orpah Maphage), and all the staff at the Department of Agriculture and Rural Development, Ngaka Modiri Molema District Municipality, North West Province South Africa for their support and cooperation during data collection.

I also wish to express my deepest gratitude to my brother's wife, Dr. Onajite Abafe, you made the mountain look like a molehill with your constant moral support and advice. To my amazing brother, Dr. Ovokeroye Abafe, if not for you, this journey would not have begun at all. Thank you very much for everything, most especially your nuggets of wisdom and criticism; you kept me on my toes. Last but not least, to my lovely niece Zuriel, you are not left out of this gratitude. Without the help of all my other siblings and their families whom I love and admire, I would not have become who I am today.

Thanks to Matthew, Apostle David, Bolium, Temileyi, (Alaye), and all my other friends, who have been wonderfully supportive with their friendships over the years.

To my parents, chief Benneth Abafe and lady Ighojabor Margaret. Their love, prayers, and kindness are the main motivation and drive towards achieving this progress. In saving the best for last, to the creator who was not created, thank you for giving me this life-changing desire and appetite. To you alone, be thy glory and adorations.

ABSTRACT

In South Africa and other parts of sub-Saharan Africa, market participation of smallholder farmers are rapidly being advocated as a means to achieve the United Nations Sustainable Development Agenda's (SDGs): zero hunger and no poverty. Yet little is known about market participation in the sunflower industry. The study therefore, examine market participation of smallholder sunflower farmers in Ngaka Modiri Molema District Municipality, North West Province, South Africa. A quantitative research approach was developed to address the research objectives, and a proportional stratified random sampling technique was used to select 177 sunflower producing households. Respondents information were captured using semi-structured questionnaires, data were then entered and coded using statistical software computer programs (MS Excel, SPSS, and Stata). Socio-economic characteristics, level of market participation, and factors influencing households market participation within the district were analyzed using descriptive statistics, household commercialization index, and probit regression model. Overall, the result indicates that respondents exhibited high level of commercialization (90.1 % market participants). While, the result of the probit regression model shows that eight (8) of the regressors were statistically significant. Variables such as age (Coef = 0.103, $p<0.01$), gender (Coef = 1.267, $p<0.05$), market outlet (Coef = 1.351, $p<0.01$), access to information (Coef = 1.298, $p<0.05$), and quantity sold in tons (Coef = 0.015, $p<0.010$) were found to have positive and statistically significant influence, while household size (Coef = -0.409, $p<0.01$), market distance (Coef = 0.618, $p<0.010$) and land tenure system (Coef = -1.541, $p<0.05$) were found to have a negative but statistically significant impact on market participation among respondents. The pseudo R^2 of the probit model is 0.5199, indicating that the model matches the dataset and the regressors accurately explains 51.99 % of the variation. The overall goodness of fit measures of the probit model was determined using postestimation test for predictive margin. With a high significant chi-square value of ($p<0.0001$), the result correctly predicted a 90 % likelihood of respondents to participate in the market. The findings suggests that rural-based initiatives and intervention programs be developed to boost households' access to finance, grants, and diversified markets for effective market competitiveness, while there is a greater need for proper awareness, supports, and partnerships focused on promoting women and youth participation in the sunflower sector across the district.

***Keywords**: market participation, smallholder sunflower farmers, rural livelihood, probit regression, household commercialization index.*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS	DEFINITIONS
AFASA	Africa Farmers Association of South Africa
AIC	Akaike information criterion
APAP	Agricultural Policy Action Plan
BFAP	Bureau for Food and Agricultural Policy
BIC	Bayesian information criterion
CF	Contract Farming
FAO	Food and Agricultural Organization
DAFF	Department of agriculture, forestry and fishery
GDP	Gross Domestic Products
GFADA	Grain Farmer Development Association
GSA	Grains South Africa
HCI	Household Commercialization Index
IPAP	Industrial Policy Action Plan
IRFC	Integrated Tamale Fruit Company
LAC	Latin America Countries
NDP	National Development Plan
NWK	North West Kooperative
OAC	Oilseeds Advisory Committee
OMOA	Organic Mango Out-growers Association
OPDT	Oil and Protein Seeds Development
SAFEX	South Africa Foreign Exchange
SAGL	South Africa Grain Laboratory
SDGs	Sustainable Development Goals
SSA	sub-Saharan Africa
TC	Transaction Cost
UN	United Nations
UNCTAD	United Nations on Trade and Development

,

CHAPTER 1. INTRODUCTION

1.1 Background of the study

Increasing market participation and linking smallholder farmers to local, national, and transnational agricultural markets is one pragmatic way of achieving the United Nations 2030 agenda towards sustainable development goals (SDGs) of zero hunger and no poverty. To some extent, the SDGs are rapidly becoming a common goal among many African countries seeking to achieve food security through smallholder farming systems. Market participation of smallholder farmers in Sub-Saharan Africa contributes significantly to agricultural production and growth, as well as to food security by reducing poverty (Otekunrin et al., 2019).

Market participation contributes to the improvement of the rural economy by increasing household living standards. Furthermore, subsistence farming systems are upgraded to commercial farming systems through market participation. Market participation, according to Alkali (2017), facilitates household access to new farming technologies, high-value markets, existing farm techniques, credits, inputs, and other consumer goods.

Market participation of smallholder farmers has been described as any market-related activity that stimulates the selling of produce and the production of marketed surpluses (Moyo, 2010; Poole, 2007). It can be considered as a farmer's ability to compete in a market effectively.Yet household's inability to participate in high-value markets is thus far gaining rapid attention as low-income countries continue to grapple with food insecurity (von Loeper et al., 2016). Commercialization of households through market participation are constrained by insufficient technical access, inappropriate policy initiatives, volatile market outlets, poor access to infrastructure, institutional barriers, among other factors (Sharma et al., 2012).

Other attributable factors are high transaction costs, missing markets, poor collective actions, high risk, labor shortages, and weak governmental services (Jari and Fraser, 2009; Zamasiya et al., 2014). von Loeper et al. (2016) posits that addressing these challenges by merely emphasizing the increase of commercial agricultural production will be counterproductive since smallholder farming can be just as productive, reliable, and sustainable to increase agricultural production as well as to achieve food security status.

In light of the above, Thamaga-Chitja and Morojele (2014): von Loeper et al. (2016) argue that, despite its potential to employ 1,000 times more people than commercial agriculture,

smallholder agriculture is yet to achieve fair market participation status due to low asset holdings. However, several components such as household age, size, gender, marital status, labor, level of education, farming experience, distance to the market, market channel, market information, access to credit, land tenure systems, and commodity prices have all been identified as factors influencing household market participation in Africa (Egbetokun and Omonona, 2012; Mathagu, 2016). Other studies have found that weak institutions, inadequate infrastructure, market regulations, agro-climatic conditions, a lack of property rights, and social and consumer preferences all impede household participation in agro-markets (Hossain and Osmani, 2015).

Mmbando (2014) asserts that many smallholder farmers are unevenly dispersed and geographically disconnected from the threshold of formal markets in many developing countries, highlighting the barriers that prevent households from engaging in high-value markets. In some case, rural farmers often face limited market knowledge and limited access to supermarkets for produce sales, as a result high transaction costs (Antwi and Seahlodi, 2011). In South Africa, however, the challenges faced by smallholder farmers are exasperated by the country's dual agricultural system regarded as the first and second economy (Piennaar and Traub, 2015).

The first tier of the economy is driven by organized and well-developed commercial farmers with access to diverse farm inputs and asset holdings, while the second dimension is occupied by economically poorer, unindustrialized, and weaker smallholder farmers operating on the periphery of the farming sector with scarce farm assets (Aliber *et al.,* 2006). Ortmann and King (2007); Obi *et al.* (2012) allude that the dual configuration of the economy has negatively impacted the architecture and trend in the agricultural sector.

Against this background, the sustainability and overall performance of the country's zero hunger strategic approach would rely exclusively upon the augmentation of agencies and institutional keenness to promote market participation among rural households (Thamaga-Chitja and Morojele, 2014). Through the aforementioned medium, smallholder farmers would be able to overcome the entry barriers to markets as it will lessening the impacts of observed and unobserved transaction costs (Poole, 2007). Increasing market participation of smallholder farmers is therefore vital towards agricultural commercialization since it avails farmers with links to markets while increasing their production capacities. Nonetheless, market participation of smallholder farmers can be promoted in a number of ways, one of which is through a

comprehensive awareness-raising initiative regarding sunflower production and its prospects to increase market participation.

Louw (2020) posits that sunflower (Helianthus Annuus L.) is the fourth largest vegetable oil in global trade after rapeseed, peanut, and soybean. Global production of the sunflower seed seat at 53 million metric tons, with Russia and Ukraine accounting for 53.6 percent of production during the 2018/2019 season (South Africa Grain Laboratory [SAGL], 2020). Sunflower is the third most versatile grain crop after maize and wheat in terms of domestic production, with high production in the North West and Free State provinces, accounting for 89.6% of the 678 000 tons produced during the 2018/2019 crop season (SAGL, 2020). Sunflowers have a long growing window and are resistant to adverse weather conditions, making them ideal for dryland areas in South Africa (Department of Agriculture, Forestry and Fisheries [DAFF], 2010). Beyond these agricultural potentials, sunflower oil is nutritious and valuable vegetable oil with a wide range of uses in households, food industries, restaurants, and the animal feed industry (Louw, 2020; DAFF, 2010). It is on this premise that the study aims to examine the factors influencing market participation of smallholder sunflower farmers in Ngaka Modiri Molema District Municipality, North West Province South Africa.

1.2 Problem Statement

Agriculture is a key economic driver in the North West Province. The sector accounts for about 13 percent of provincial GDP and employs 18 percent of the province's workforce (North West Provincial Page, 2019). The Province is the second-largest producer of sunflower after the Free State, with Ngaka Modiri Molema District contributing a great share of the total province’s 32 percent production in South Africa (DAFF, 2018). The crop is produced by both commercial and smallholder farmers in the Ngaka Modiri Molema District Municipality, albeit commercial farmers account for most of the production and partake more in the market than smallholder farmers. Nonetheless, sunflower is a profitable high value cash crop with a rising demand that is primarily use for producing oilcake and vegetable oil, which contribute nearly 60 percent of the locally oilseed crop produced (Van Zyl, 2010; DAFF, 2018).

Sunflower production is therefore, an excellent choice for both local and national agribusiness with significant potential in smallholder farming systems due to low input costs, consistent yields, and a short growing window (DAFF, 2017; Markowitz, 2018). In 1999, the domestic sunflower industry experienced a production boom of over a million tons on 828,000 hectares

of land with an average yield of 1.4/ha, comparable to the four leading sunflower producing countries i.e., Ukraine, the EU-27, Argentina, and Russia (Meyer et al., 2015; DAFF, 2017).

Since the peak of production, the total area farmed for sunflower production has declined, resulting in a decrease in average yield per hectare, with sharp falls in the North West Province as opposed to other provinces (Bureau for Food and Agricultural Policy [BFAP], 2016). This has led to the increase of seed imports, oil, and oilcake to meet the raising domestic demand in the oilseed sector (Meyer et al., 2015).

The mandate of South Africa's National Development Plan (NDP) for 2030 affirms that household farming is one of the leading sectors with greater potential for job and income creation than the commercial agriculture (Mmbengwa *et al.,* 2018). While very little has been accomplished through interventions and strategies aimed at boosting the smallholder farming system, particularly in the sunflower industry. For instance, the Agricultural Policy Action Plan (APAP) and the South African Industrial Policy Action Plan (IPAP) aimed at improving the agricultural sector have been identified to lack specific strategies regarding edible oil and oilseed industry (Jahari *et al.,* 2018).

These interventions failed to regard oilseed crops as a strategic commodity on the APAP side, while the IPAP was limited to labor-intensive subsectors such as poultry, milling, and fruit (Jahari *et al.,* 2018). The strategies and their impacts on smallholder sunflower farmers' has been met with an ambivalent responses. While the consequence of the barriers faced by sunflower-producing households is reflected in restricted access to diversified high-value markets and continuous reliance on market intermediaries for sales of produce, which inevitably affects their income returns. Correspondingly, the glitches have caused smallholder sunflower farmers to barely play a significant role in North West Province and South Africa as a whole. The situation posed by limited market outlets also results in farmers' exploitation due to the unfair exchange arrangements (Lekunze *et al.*,2011)

As van Zyl (2020) emphasized, participation in the sunflower industry will require a thorough understanding of the intrinsic characteristics of the sector, its core product markets, and proper knowledge of the underlying effects of changes in elements of influence. Yet little is known regarding market participation of households in the sunflower industry. While there are few studies on market participation, especially in cattle and vegetable farming, none have actually been focused on market participation of sunflower producing households in North West Province South Africa. It is in this regard that the study attempts to use deterministic approach to examine the market participation of smallholder sunflower farmers.

1.3 Objective of the study

The main objective of this study is to examine market participation of smallholder sunflower farmers in Ngaka Modiri Molema District, North West Province, South Africa.

1.4 Specific Objective

1. To examine the socio-economic characteristics of sunflower producing households in the study area.
2. To determine the level of market participation of sunflower producing households in the study area.
3. To analyze the factors influencing market participation of sunflower producing households in the study area.

1.5 Research Question

The main research questions in this study are;

1. What are the socio-economic characteristics of smallholder sunflower farmers in the study area?
2. What is the level of market participation of smallholder sunflower farmers in the study area?
3. What are the factors influencing market participation of smallholder sunflower farmers in the study area?

1.6 Significance

Market participation of smallholder sunflower farmers is crucial to South Africa's oilseed and agricultural sectors. Understanding the factors that influence market participation of smallholder sunflower farmers can help to boost production, awareness, empowerment, and increased participation of rural households in the sunflower value chains. The study will aid in understanding market participation and how the factors influencing market participation can be effectively harnessed to promote market participation among farmers (sunflower farmers) in the Ngaka Modiri Molema District Municipality and across South Africa.

The findings of this study will also help stakeholders, industry players, and policymakers to implement strategies in the sunflower industry that will ensure sustainable production while also ensuring local and international competition. Moreover, the findings of the research are envisaged to inform appropriate policies that will increase profit margins for sunflower-producing households in the study area. While there has been a substantial amount of research into various aspects of market participation among smallholder farmers in South Africa, there has been very little research into sunflower production as a means of ensuring greater market participation among smallholder farmers. Despite its enormous potential to generate and boost household income within the North West Province.

The findings of this study will contribute to the existing debates on market participation of smallholder farmers at district, provincial and national levels, and will therefore serve as a blueprint for other related trends on market participation. Understanding what smallholder farmers, particularly those in the sunflower sector, have accomplished in terms of market access is crucial to government and private sector programs.

1.7 Definition Terms

Market Participation – Market participation refers to the measure for determining household commercialization based on the quantity of produce sold.

Market Participant – Market participant is defined as an economic agent acting as a producer or supplier of marketable goods and services.

Smallholder farmers – They are farmers with a low asset base, mostly found in economically disadvantaged areas that operates on few hectares of land, while relying on family labour for crop production.

The level of market participation – This is the percentage used to calculate the total quantity sold from the overall volume of crop outputs.

Sunflower – *Helianthus Annuus* commonly called a sunflower, is a plant with an erect rough-hairy stem of large annual forb, primarily used in the production of vegetable oil for human consumption and oilcake for livestock feed.

Socio-economic factors – These are the factors that influence the economic and socio welfare of a household.

Value Chain – It is known as the transformational movement of a commodity within an industry, from production to final consumption level, or as a process of adding value to a raw material through production, processing, manufacturing, and other activities carried out by the company on the product before it reaches its final consumers.

Market outlet – is the downstream section of the value chain where a product is made available to consumers through chain actors at separate outlets.

1.8 Ethical considerations

Ethics is defined as a "collection of moral standards that include guidelines and accepted practices about the most appropriate conduct," thus serves as a guide for researchers to avoid scientific malfeasance (Mazibuko, 2018). Ethical considerations and standards, as suggested by the authors, were followed at each point of the study in accordance with University of South Africa (UNISA) legislation, and standardization and sameness were implemented for all respondents during the study. Consent to collect data from respondents was obtained from the District Department of Agriculture and Rural Development. They were notified and briefed regarding the objectives of the research. The ethics procedure is as follows:

1.9.1 informed consent

An information sheet was used to obtain consent from the survey participants prior to the interviews. This is crucial as it presents prospective respondents with an overview of the research and its intent.

1.9.2 Voluntary participation

The participants were made aware that their participation was entirely voluntary. The researcher made it clear that participation was neither mandatory nor compulsory. Furthermore, no coercion or underhanded methods were used to elicit information from participants. They all had advanced knowledge of the survey.

1.9.3 Potential for harm

Participation in this survey did not lead to, nor prompted any form of harm, inconvenience, or discomfort to participants.

1.9.4 Confidentiality and enormity

The researcher clearly explained to each participant regarding confidentiality of the survey and how the questionnaires would be discarded after the completion of the study. They were assured that the information gathered during the interview would be used solely for research objectives and that their privacy, rights, and identities would be protected.

1.9.5 Eligibility criterion

The eligibility requirements are the conditions that a household farmer must meet in order to participate in the survey. They are as follows:

a. The farmer must be willing to voluntarily participate
b. Farmers that are involved in smallholding sunflower production.
c. Farmers in Ngaka Modiri Molema District Municipality producing sunflower.
d. Must be registered with the Department of Agriculture and Rural Development in the district municipality and or be communally recognized by local chiefs as a sunflower farmer.

1.10 Chapter outline

The study is divided into five chapters.

Chapter 1: The chapter presents an overview of the introduction, problem statement, significance, objectives, research questions, limitations, and definition of terms of the study..

Chapter 2: Chapter two presents detailed reviews of the relevant literature on global and South African sunflower production, smallholder farmers in Global and South Africa spectrums, sunflower value chain, supply and demand for sunflower in South Africa, market participation, stakeholder relations in sunflower production, and factors that influence smallholder farming systems such as transaction cost, market channels, access to market, access to market information, social capital and infrastructure.

Chapter 3: The chapter presents the research methodology, details of the study area, research design, data collection, and the analytical techniques used to achieve the various objectives of the study.

Chapter 4: The discussion and results of the analysis were covered in this chapter.

Chapter 5: This chapter included the conclusion, summary, main findings, and policy recommendations.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

The chapter presents a comprehensive review on literatures regarding sunflower production in South Africa as well as on a global scale including reviews on sunflower value chain, supply, and demand for sunflower in South Africa, stakeholder relations in sunflower production, smallholder farmers, market participation from global to domestic view as well as factors influencing smallholder market participation such as market access, market channels, transaction costs, market information, social capital, infrastructure, and contract farming.

2.2 Global production of the sunflower crop

Sunflower oil is a valuable vegetable oilseed crop of global importance, native to North America although crop commercialization began in Russia (Boshoff, 2008). Sunflower oil is a premium vegetable oil which contains high linoleic, oleic and healthful fatty acids given a low saturated fatty acid content as opposed to palm oil and soybean, thus aids in the reduction of bad blood cholesterol (van ZYL, 2010). That being said, the global market for vegetable oils is dominated by palm oil and soybean, both of which account for roughly 60 percent of the global vegetable oil production, whereas sunflower oil represents only 8 percent (van Zyl, 2010).

Archaeological data attributed the first sunflower crop cultivation to the American Indians in the year 3000 BC, present-day Arizona, and New Mexico. The world production of the sunflower crop in 2014 was 15.85 million metric tons, where Ukraine, Russia, Argentina, and Turkey contributed 27.8 percent, 25.6 percent, 5.9 percent, and 4.6 percent respectively to total production (Tridge, 2014). The key factors influencing the production and consumption of sunflower crops is the natural rise in demand due to population growth, the area planted and yield capacity (Boshoff, 2008). Sunflower production in Russia and Ukraine is expected to remain profitable in the rotation due to the high adaptability and the low input nature of the crop (Meyer *et al*., 2015). Also, the sunflower crop is an ideal crop for Ukrainians due to its low farming cost, risk-averse and yield resilience nature (Meyer *et al.,* 2015).

Typically, countries with the highest sunflower yield are responsible for the largest share of total areas harvested for sunflower in global settings (Meyer *et al.*, 2015). Following this, Argentina is the country with the highest yield per hectare due to the low production cost, which is 20 percent lower compared to Brazil and 25 percent lower when compared to the United States, making Argentina the world most robust sunflower producer (Meyer *et al.*, 2015). In Argentina, farmers cultivate sunflower in areas with low productivity conditions, leaving the more fertile soil for maize and soybean production. Besides, Argentina has a better advantage regarding production conditions due to the availability of advance tools cemented by the country's natural resources (Meyer *et al.*, 2015).

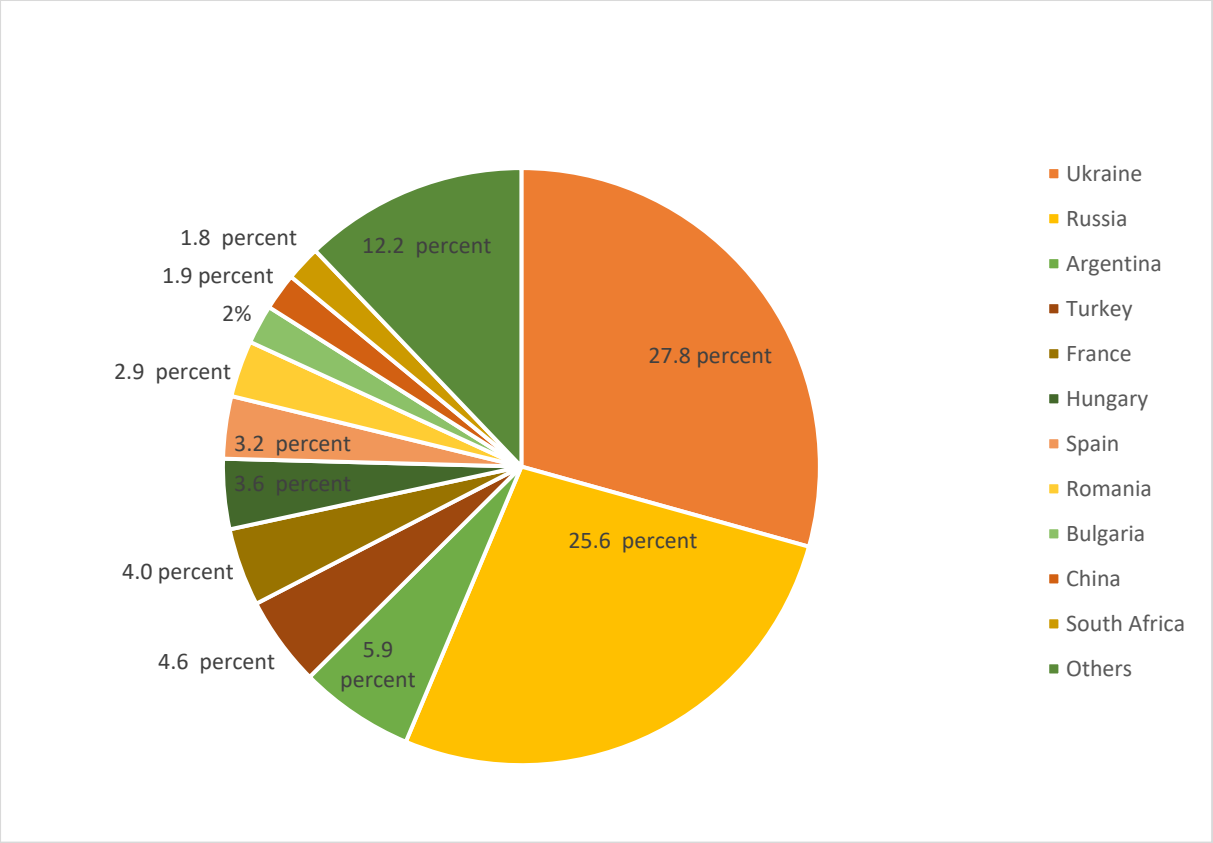

Figure 2.0: Global sunflower production by country

Source: Tridge (2014)

2.3 Production of sunflower in South Africa

South Africa makes up for 1.8 percent of global sunflower production with a domestic average yield of 1.3 tons per hectare compared to the other international average yield of 1.6 tons per hectare (Meyer *et al.*, 2015; Bureau for Food and Agricultural Policy [BFAP] 2016). The crop occupies 3.8 percent of the entire arable land in South Africa, where Free State, North West and Limpopo Province accounts for 57 percent, 38 percent, and 4 percent respectively in the total sunflower produced (South Africa Grain Laboratory NPC, 2020). South Africa entered the international sunflower market in the late 1980s, where the area grown for commercial sunflower production experienced increases up until 1999 (van Zyl, 2010).

Findings over the years have shown that there is a significant decline in domestic sunflower production. Explicitly, domestic production has failed to match local demand despite having the status of an ideal crop suitable for South Africa summer rainfall and dryland regions (DAFF, 2018). Meyer *et al.* (2015) revealed that almost 95 percent of South Africa's sunflower crop produced is used for vegetable oil production, however, local sunflower oil production is yet to meet domestic demand. The volume of seed crushed influences the proportions of domestic sunflower oil produced, whilst in the event of seed shortage, processors in turn reckon on import of unprocessed sunflower oil (van Zyl, 2010). This underscores self-insufficiency with a gap between seed processing, domestic consumption and production of the sunflower crop.

The optimal benefit of the sunflower value chain is yet to be fully utilized, given the abundance of vast arable land and double crushing capabilities that could have justified government and stakeholder investment in the sunflower sector (Jahari *et al.*, 2018). The situation had in the past affected the country's sunflower production. For instance, the average sunflower yield for the 2016/2017 crop season was 1.38 t/ha, with commercial seed production of 874 595 tons, of which 3.8 percent (34 725) tons was contributed by smallholder farmers (DAFF, 2017). In the same period, the commercial area grown for sunflower production witnessed an 11.5 percent decrease to 635 750 hectares, from an estimated 718 500 hectares of the previous season (DAFF, 2017). Likewise, in the 2018/2019 crop season, the total area grown suffered even more decline to 515,350 hectares compared to the earlier seasons (South Africa Grain Laboratory NPC, 2020).

Among the highlighted reasons for the reduction were the introduction of a new maize variety with greater yields, practical restraint of producers like the negative point of view towards crop

which emanated from notable events such as marginal land exclusion under crop cultivation, Sclerotinia, lodging and crop depredation by birds (The Bureau for Food and Agricultural Policy [BFAP], 2016). The sunflower industry is yet to attain its rightful place despite a 40 percent rise in the domestic oilcake and vegetable oils demand. Notwithstanding, South Africa has the inherent potential to increase production from 1.3 t/ha to 1.67 t/ha as well as to advance national crop output to match the four major producing countries (Meyer *et al*., 2015). Figure 1 below shows an overview of the provincial contribution to sunflower production and Table 1 shows a summary of the two-season for sunflower production in South Africa.

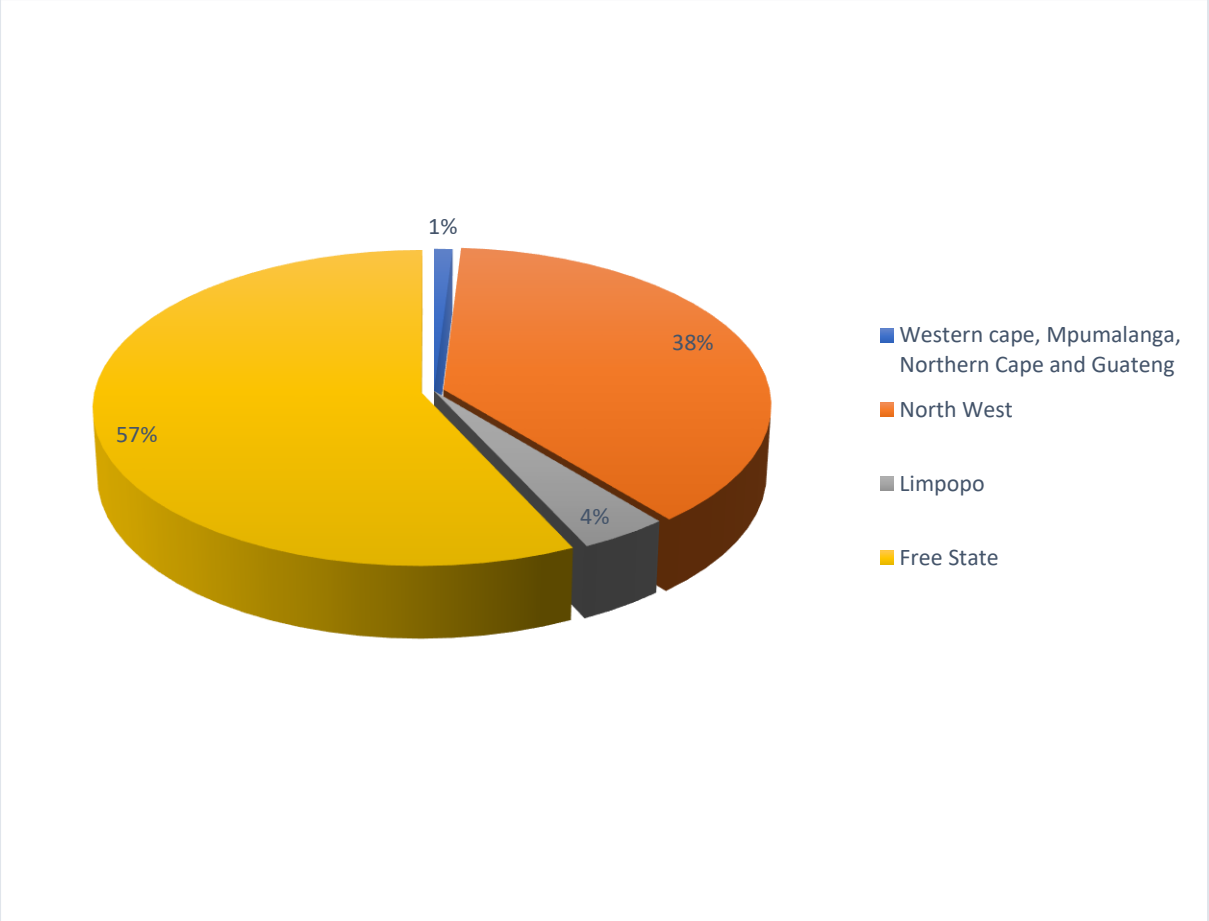

Figure 1: Overview of 2017/2018 provincial contribution of sunflower production in South Africa

Source: DAFF (2018)

Table 2.0 Summary of sunflower production for two seasons in South Africa

Province	Type of production	2017/2018			2016/2017		
		Hectares planted, ha	Production, tons	Yield, t/ha	Hectares planted, ha	Production, tons	Yield, t/ha
Western Cape	Dryland	100	100	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	100	100	-	-	-	-
Northern Cape	Dryland	-	-	-	-	-	-
	Irrigation	1 600	1 920	1.20	250	400	1.60
	Total	1 600	1 920	1.20	250	400	1.60
Free State	Dryland	312 200	486 000	1.56	328 000	475 000	1.45
	Irrigation	1 800	4 000	2.22	2 000	3 000	1.50
	Total	314 000	490 000	1.56	330 000	478 000	1.45
Eastern Cape	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
KwaZulu-Natal	Dryland	-	-	-	300	300	1.00
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	300	300	1.00
Mpumalanga	Dryland	2 300	2 180	0.95	2 200	2 300	1.05
	Irrigation	-	-	-	-	-	-
	Total	2 300	2 180	0.95	2 200	2 300	1.05
Limpopo	Dryland	44 500	34 750	0.78	87 500	82 500	0.94
	Irrigation	500	1 250	2.50	2 500	3 000	1.20
	Total	45 000	36 000	0.80	90 000	85 500	0.95
Gauteng	Dryland	5 050	4 500	0.89	2 600	2 500	0.96
	Irrigation	450	1 100	2.44	400	500	1.25
	Total	5 500	5 600	1.02	3 000	3 000	1.00
North West	Dryland	231 900	323 950	1.40	207 500	300 000	1.45
	Irrigation	1 100	2 250	2.05	2 500	4 500	1.80
	Total	233 000	326 200	1.40	210 000	304 500	1.45
RSA	Dryland	596 050	851 480	1.43	628 100	862 600	1.37
	Irrigation	5 450	10 520	1.93	7 650	11 400	1.49
	Total	601 500	862 000	1.43	635 750	874 000	1.37

Source: South Africa grains laboratory NPC (SAGL, 2019).

2.4 Sunflower value chain in South Africa

Value chains are techniques that are used to examine how the various activities within a company are interconnected. It comprises all the activities executed within an organization to produce a particular type of output. A chain can be described as a series of connected activities and agents that are interlinked by flows of materials, information and resources on trade and production of specific products. The concept of a value chain is connected to the notion of governance which is of great relevance to sunflower farmers since sunflower is sold at the current seasonal South African Foreign Exchange price (SAFEX). Accordingly, the value chain approach are used to comprehend social ties and cultural norms that can be employed to make inferences about the participation of the low-income earners and the possible impact of value

chain advancement on increasing household income to ensure food security and sustainability in the sunflower sector (Rosales *et al.,* 2017).

Globally today, sunflower seed is used regularly by humans for domestic and industrial purposes and also by the livestock industry in the formulation of poultry and dairy feeds (Boshoff, 2008). The intensified global interest in bio-fuel with regards to a healthy lifestyle and the increased price of international energy are some of the major forces that are influencing the consumption and production of sunflower oil (Boshoff, 2008). Besides, the author posited that an increase in per capita income and population growth increases the demand pressure in the transnational oilseed (sunflower) sector. However, the extraction of vegetable oil is of the utmost significance of the sunflower crop in South Africa. The refining process of sunflower seed is capital intensive and requires specialized knowledge/ technology (DAFF, 2018).

Domestically, the sunflower seed is delivered by farmers or through seed import to grading agents or seed expressers for seed crunching. The graded and cleaned sunflower seeds are kept in silos and are crushed using mechanical or chemical extrusion techniques for the extraction of oil, oilcake and hull (Jahari *et al.,* 2018; Mathagu, 2016). Following Boshoff (2008) the oilseed processing industry in South Africa comprises of three vital processing divisions. Firstly, the mechanical and traditional expelling or crushing method which is used for the extraction of soft oilseed such as sunflower seed with high oil content. This method produces oilcake/meal that are graded according to a specified requirement, and then sent to either the domestic feed market or the fertilizer and waste sector or the solvent extraction division for further processing. The expelled oil obtained is then filtered and sent through the domestic oil market for consumption.

The second procedure is the extraction using solvent methods for processing oilcake/meal and oilseed with less than 20 percent oil content, suitable for non-soft oilseed such as soybean. In this method, the extracted solvent oil is sent to an oil refinery and after a certain process, the refined oil is sold to the domestic oil market; however, when there are production surpluses, it is then sold at a discounted price to the local feed market or exported. The final processing method is the hybrid processing technique known as the expander-solvent extraction technique used for high oil content raw materials, which prepares the soft oilseed for maximum oil extraction before going through the solvent extraction technique. The cultivars and extraction method determine the oilcake and oil content level, but most of the seed crunched in South Africa constitute 50 percent oil, 40 percent oilcake and 10 percent hull (DAFF, 2012). The major products of sunflower seed crushing generate high-value inputs in the form of edible oil

and oilcake. The processed oil is either sold or further processed for the manufacturing of margarine, cooking fat, biofuel, massage blend and fat spread used daily by a vast population of households, while the oilcake is used for the manufacturing of animal feed to produce concentrate in the form of sunflower oilcake meal (DAFF, 2017). Figure 2 shows the various steps involved in the processing of sunflower oil.

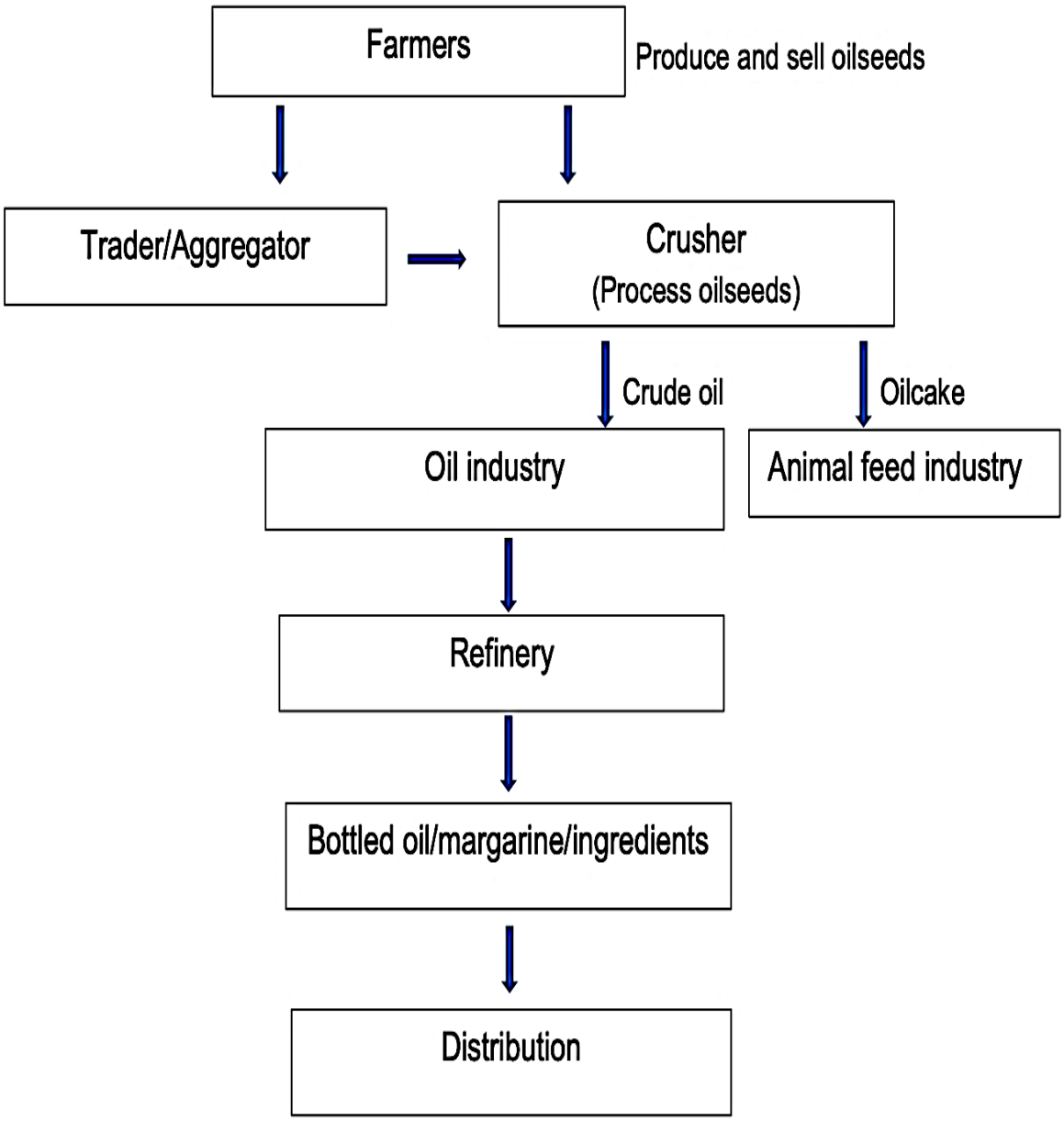

Figure 2: Oilseed to oil and fat value chain

Source: Jahari *et al.* (2018)

2.5 Support given to sunflower producing households

Grains Farmers Development Association (GFADA) an initiative that grew out of the grain value chain network in collaboration with Maize Trust, Sorghum Trust, Winter Cereal Trust, and Oil and Protein Seed Development Trust met in 2015 to address the transformation imperatives and insight within their respective sectors regarding supports for black smallholder farmers. With the aim of finding resources that will add value to the growth and development of black farmers, the association collaborates with service providers along the grain and oilseeds-related value chains that have implementation capability.

GFADA engages with the government and contributes to the creation of an enabling policy and regulatory system for the realization of its vision (Tshiame, 2018). They attempt to secure additional funds for the transformation projects from all levels of government as well as relevant private sector organizations. This engagement led to the acquisition of R8 064 million from the Eastern Cape Department of Rural Development and Agrarian Reform to support the Matatiele area for the 2017/2018 season. More precisely, in the sunflower sector, the engagement with the Oil and Protein Seeds Development Trust (OPDT) and Oilseeds Advisory Committee (OAC) resulted in the approval of R728 800 to support smallholder farmers through funding of crop insurance, soil correction, and mentorship in the 2017/2018 season (Tshiame, 2018). However, this support, among other supports is yet to register significant impacts on households in the downstream sector of the sunflower industry.

2.6 Sunflower supply and demand in South Africa

The main driving force in the South African sunflower seed complex market is the local supply of sunflower seed (van Zyl, 2010). The primary demand for the sunflower seed in South Africa stems from the producer of animal feeds (oilcake supplements) and the vegetable oil industry (Boshoff, 2008). The local sunflower industry is an interdependent system comprising of demand, supply and price linkage (market) sectors. This interaction influences the consumption and production of the sunflower crop (Boshoff, 2008). Additionally, import parity, the value of oilseed, oil content and cost of transport determines the purchasing decision of sunflower seed in South Africa (Jahari *et al.,* 2018). Nevertheless, local demand is relatively higher than supply, thus South Africa is projected to remain a net importer of oilseed (sunflower crude oil and oilcake) from South America (Meyer *et al.,* 2015; Van Zyl, 2010).

In 2017, the domestic sunflower industry manage to supply 67 percent of the oilcake demand, whilst the balance of oilcake demand was supplied via the import of sunflower seeds (Van Zyl,

2010). Oilcake demand has been projected to increased by 28 percent (2,18 million tons) in regards to the driven demand by feed manufacturers which will result in an increased demand for sunflower seed by 2027 (Meyer *et al.,* 2015). The primary element influencing the consumption and production of sunflower meal/oilcake is the global increase in demand for high animal protein (Boshoff, 2008).

The current crushing capacity of sunflower seed is 1.8 million tons, of which 900,000 tons is in use and the remaining 900,000 tons is currently being underutilized (Meyer *et al.,* 2015). The main consequence of this underutilization has cost the country approximately R154 million in value from the importation of 88,000 tons of oilcake between 2009 and 2012 (Meyer *et al.,* 2015). The authors stated that South Africa's crushers would require an additional 206,000 tons of seed to meet 88,000 tons of oilcake production. Additionally, a total of 1,027,778 tons of crops based on seed extraction of 36 percent of oilcake and 45 percent of oil would be needed to overcome the imbalance in the domestic market for oilcake (Meyer *et al.,* 2015). Table 2 shows the demand and supply of sunflower seed in South Africa and Table 3 show the global demand and supply of sunflower seed.

Table 2.1 Supply and demand of sunflower seed in South Africa (through July 2019)

Market season	**Final for 2018/2019**	**Projection for 2019/2020**
	Tons	Tons
CEC (crop estimate)	**862,000**	**655,640**
Supply		
Opening g stock(1mch)	154,841	120,165
Production deliveries	863,184	655,640
Import for S. A	1,324	40,000
Surplus	6863	7,000
Total	**1,026,212**	**822,805**
Demand		
Processed	900,045	727,500
Human	1,609	1,500
Animal	5,114	6000

Crush (oil and cake)	893,322	720,000

Table 2.1 continue

Withdrawn by producer	519	500
Release to end consumer	1,764	1,500
Seed for planting purpose	3582	3200
Net receipt (-)/disp(+)	-378	1500
Deficit	0	0
Export	515	500
Total Demand	**906,047**	**734,700**
Ending Stock (28/29 Feb.)	120,165	88,105
-Process seed per/month	75,004	60,625
-Monthly stock	1.6	1.5
-Days stock	49	44

Source: NAMC (2019)

Table 2.2 Global demand and supply of sunflower seed for two seasons

Season	2013/14	2014/15	2015/16	2016/17	2017/18 (Revised)	2018/19 (Forecast)
Area Harvested (1 000 Ha)	***25 730***	***24 708***	***25 242***	***26 964***	***27 291***	***27 802***
Yield (MT/Ha)	***1.68***	***1.67***	***1.70***	***1.86***	***1.82***	***1.88***
Production (1 000 MT)						
Argentina	2 250	3 000	2 830	3 300	3 400	3 800
European Union	9 105	9 006	7 769	8 641	9 985	9 546
China	2 423	2 380	2 698	2 750	2 800	2 860
Russia	10 200	9 000	9 700	11 600	11 000	12 000
Ukraine	10 941	10 250	12 100	15 100	13 500	15 500
United States	917	1 005	1 326	1 203	978	961
South Africa	736	736	755	874	859	740
Turkey	1 450	1 350	1 350	1 470	1 700	1 540
Other	5 315	4 607	4 386	5 130	5 343	5 341
TOTAL	***43 337***	***41 334***	***42 914***	***50 068***	***49 565***	***52 288***
Import (1 000 MT)						
Turkey	581	523	436	611	721	780
European Union	329	275	577	632	520	600
Other	1 050	1 078	1 100	1 396	1 305	1 346
TOTAL	***1 960***	***1 876***	***2 113***	***2 639***	***2 546***	***2 726***
Export (1 000 MT)						
Argentina	80	63	302	74	58	100
United States	132	126	107	99	89	70
Russia	131	61	105	362	98	200
Ukraine	71	123	171	261	50	200
Other	1 536	1 462	1 467	1 804	2 253	2 155
TOTAL	***1 950***	***1 835***	***2 152***	***2 600***	***2 548***	***2 725***
Oilseed crushed	***38 360***	***36 581***	***38 177***	***44 845***	***44 974***	***47 114***

Source: South Africa grains laboratory NPC (SAGL, 2018).

2.7 Stakeholders relationship in sunflower production

Stakeholders are actors which include persons, groups, institutions, neighbourhoods, and society (Mitchell *et al.,* 1997). They represent a vested interest in the promotion of policies, projects or programmes. To this end, various players are involved in agricultural production: suppliers of resources such as market information, inputs and services, transporters, processors, retailers, consumers, promoters and managers. These group of people may belong to the formal and informal economy, as well as to the private and public sectors. Stakeholder networks and communications in the sunflower production will facilitate household access to profitable markets (Mathagu, 2016). Also, non-governmental organizations and companies can aim to invest in household farming system to meet the increased demand for food, improved health services and predictable incomes (Vellema *et al.,* 2013). Stakeholder involvement in the sunflower sector will greatly boost equity, create developmental opportunities and promote market competition that will lead to increased market participation among smallholder farmers.

In Ghana for instance, the Integrated Tamale Fruit Company (ITFC), owned by a Dutch and Ghanaian company that grows and export organically certified mango from Ghana employs the services of the intermediary body to contract farmers to produce mangoes. The mango are grown by 1200 out-grower farmers in a nucleus estate occupying 155 hectares that are owned by the company (Arias *et al.,* 2013). The out-grower farmers are structured in the Organic Mango Out-growers Association (OMOA), that is involved in the contractual agreement, price negotiation and benefits with (ITFC). This venture has seen enormous support from NGOs and development agencies in developing strengths in the production of organic mangoes by these out-grower farmers (Arias *et al.,* 2013). The farmers are also provided with farm inputs like seedlings, organic fertilizers, equipment and a long-term loan on zero interest that is repayable after five years from the sale of mangoes to ITFC. Nonetheless, growers can sell their produce to buyers of their choice after fourteen years when the loan has been cleared (Arias *et al.,* 2013). Similarly, the out-growers are provided with technical support such as irrigation, pest and disease control, guaranteed market and certification (Arias *et al.,* 2013). The out-growers are expected to earn an annual minimum profit of approximately $2000 from the fifth year, which is far above the annual average farm income of $300 in Tamale, Ghana (Arias *et al.,* 2013).

2.8 Market participation of smallholder sunflower farmers in South Africa

There is no denying that studies on smallholder farmers' participation have been conducted on a variety of agricultural commodities, particularly in agrarian societies like Africa, which cannot be unrelated to the central role of market access in the lives of households, particularly those with income tied to crop and animal production (Mathagu *et al.,* 2018). Yet, one of the biggest issues facing smallholder sunflower producers in South Africa, according to the authors, is the absence of direct interaction between household producers and consumers. Lekunze *et al.* (2011) studying the constraints affecting sunflower production, explains that South Africa poses the potential in terms of land availability and technology to capitalize on the increased demand for sunflowers, but households are still underperforming due to impediments such as lack of irrigation infrastructure, which limits crop outputs. According to Daff (2019), lack of black economic empowerment in the sector, as well as in the seed trade business in general, has been noted as major barriers to farmers entering into the sunflower sector, compounded by imperfect credit markets and lack of finance for procuring the needed equipment to spur operations off ground, among other things. This situation limits income returns for existing households and discourages new entrant farmers to meaningfully participate in the sunflower economy.

2.9 Overview of smallholder farmers in sub-Saharan Africa

Smallholder farming is the major economic mainstay of over 70 percent of the world's poor population that globally contributes 60 percent of agriculture and accounts for 80 percent of the entire food consumed in Asia and sub-Saharan Africa (Poole, 2017). Household farming systems are the major economic drivers in many sub-Saharan African countries (DAFF, 2012). Reports by Food and Agriculture Organization of the United Nations suggests that growth in the agricultural sector in sub-Saharan Africa is 11 times more viable to elevate the standard of living and to also mitigate poverty than the growth in any other sectors (Karuku, 2014). Hence, the role of smallholder farmers toward economic development, human welfare and poverty reduction in developing nations of the world cannot be ignored.

The concept of smallholder farming is relative to a country's ecological zone and context. In a general context, smallholder farmers can be described as marginalized farmers cultivating less than 2 ha of land and characterized by poor livelihood assets and mass illiteracy (Torimiro *et al*., 2014). They are described as farmers with limited resource endowment in contrast to commercial farmers (DAFF, 2012). In South Africa, smallholder farmers are mostly referred

to as black farmers occupying the former homeland region that produces food on a substituent level (Aliber *et al.,* 2009; van Schalkwyk *et al.,* 2012**)**.

The development process of the smallholder farmers are impaired by several vital economic factors that are required to overcome market challenges. They are faced with poor production, deficit investment level, outdated agricultural practices, limited access to inputs, high seasonal labour fluctuations as well as inadequate knowledge of advance technology (Poole, 2017). Despite current market liberation and growing of agribusinesses, smallholder farmers in Africa are still confronted with the absence of forward and backward market linkages i.e. small-scale entrepreneurs and household farmers have little link to cost-efficient and dependable inputs such as farm credit, reliable and profitable output markets, fertilizers, mechanization services and limited agricultural extension services (Anim *et al.,* 2008). As a consequence, this has led to the constant drifting of rural population to urban settlements.

In South Africa, about three million households are involved in smallholder farming systems but most are restricted from participating in the modern agricultural value chains; amidst their recognition to alleviate poverty and the medium to attract rural development (Pienaar and Traub, 2015; von Loeper *et al.,* 2016). Study after study has consistently shown that much success has not been recorded from programmes and initiatives to boost smallholder farmers in Africa. In South Africa, for example, the underperforming land recapitalization reforms project, one home and one garden of KwaZulu-Natal and even the comprehensive agricultural support program (CASP) have all yielded ambivalent outcomes (Thamaga-Chitja and Morojele, 2014). Equally, attempts made by the Public-Private Partnership (PPP) to promote smallholder agriculture in the semi-arid lower eastern region of Kenya have been met with several drawbacks (Kavoi *et al.,* 2014). In the same accord, despite government interventions to transform the agricultural sector in Rwanda, many households are still constrained in substituent farming systems and poverty (Mbitsemunda and Karangwa, 2017).

Ultimately to achieve a long-term goal of food security, there is a need for better political will and an explicit understanding of the ways and diversity of smallholder agriculture. This will facilitate policy intervention through which these constraints can be overcome. There is a pressing need for detailed information and empirical data on the condition and challenges faced among smallholder farmers in Africa, most especially in South Africa to facilitate future initiative programs by policymakers **(**van Schalkwyk *et al.,* 2012). Smallholder farmers are an important catalysts to the agricultural sector of sub-Sahara African nations thus improving their

farming practice will lead to increased production output, positive trade balance, increased youth and female employment.

2.10 Smallholder farmers in Asia, Latin America and the Caribbean

About 87 percent of the world's 500 million small farms are found in the Asia- Pacific region where China accounts for almost (193 million), India (93 million), Bangladesh (17 million), Indonesia (17 million) and 10 million small farms in Vietnam (Patkar *et al.*, 2012; Thapa, 2010). Additionally, the Caribbean and Latin American countries such as Brazil, Colombia, Chile, Nicaragua, Ecuador and Mexico account for 11 million small farms, while 0.3 million in Uruguay, 0.27 million in Paraguay, and 0.25 million small farms in Argentina and Chile (Thapa, 2010; Marquez and Ramos, 2010). However, there are significant differences in terms of the average household farm size (area cultivated in hectares) between these nations. For instance, the average farm size in Bangladesh is 0.5 hectares, 1.4 hectares in India, 3.0 hectares in Pakistan, 0.8 hectares in Nepal and Sri Lanka, 20-30 hectare in Chile and Brazil, 8 hectares in Paraguay, less than 2 hectares in China and over 100 hectares in Uruguay and Argentina respectively(Thapa, 2010).

Globally, smallholder farmers contribute significantly towards food security and they are also the principal element in the inclusive developmental process, yet they are constrained by poor productivity and inability to achieve production surpluses (Arias *et al.*, 2013). Smallholder farmers are depicted by volatile production as a result of limited access to finances and inputs, poor knowledge of improved farming technologies, outdated farming practice, low investment level, unstable production, lack of storage facilities and a non-competitive market. Farmers in the Caribbean, Asia, and the Latin America region have also been described as farm families involved in agricultural production living within farm settlement and depends on family labour due to lack of financial access for hired labour (Thapa, 2010). Against this background there are three basic unanimous characteristics that makeup smallholder farmers in Latin America and the Caribbean (LAC), they are small farmland, family-operated and have limited or unavailable hired labour (Berdegue and Fuentealba, 2011). Thus, it can be noted that smallholder farmers face heterogeneous and diverse constraints. There is no one size fit all solution that can be administered to these problems; however, accumulation of wealth and capital remains the main constraints existing among all smallholder farmers.

Following United Nations Conference on Trade and Development ([UNCTAD] 2015), the dichotomy existing between the commercial farming and smallholder farming system is reflected in four main areas such as (a) the comparative increase in the number of commercial farms in emerging nations (b) foreign investors acquisition of large farms which threatens to intensify marginalization of household farming in the multifaceted trading system (c) small farms are constrained by the increased opportunity cost of depending on labour and the availability of labour that is gradually approaching its limits in emerging nations and lastly, the rigid competition across nations and uneven value chains which restrict household farmers from participating in international trade. Unlike commercial farms, that are better at managing integration into supply chains and product certifications practices that is existing in international trade.

These set of farmers (smallholder) often lack the ability to expand production even when there are opportunities to increase food prices as a result of poor access to credit and proper services. The challenges are further exacerbated by trade liberalization and globalization (Arias *et al.*, 2013). Ironically, most policies and public strategies targeted to boost these group of farmers in LAC countries have all registered low impact because of the failure to recognize the heterogeneity and diversity existing within the ranks of smallholder farming system (Berdegue and Fuentealba, 2011). The development prospect and performance of household farmers in the LAC region rely considerably to a characteristic degree in the proximate context on which their decision is made (Berdegue and Fuentealba, 2011). Thus it is necessary to distinguish developmental policies and strategies in regards to the three primary characteristics of smallholder farming system in LAC countries (Berdegue and Fuentealba, 2011). Furthermore, policies should be centered on households, farms, asset development, farmers organization, farmers capacities and on the territorial background in which these farmers operate (Berdegue and Fuentealba, 2011). The focus should be geared towards the local food market with special focus on commodities and public goods and services in line with the total numbers of household farmers in LAC countries (Berdegue and Fuentealba, 2011).

2.11 Market participation of smallholder farmers

Market participation decisions among smallholder farmers are influenced by several elements in low-income nations. Market participation is the process of transitioning from subsistence or lower level of commercialization to higher level of commercialization. It is influenced by a farmers' ability to produce products that meet market expectations in terms of quality, standard,

supply consistency and the ability to deliver the product on time for sale at a viable price. Examining the elements influencing market participation among smallholder farmers in middle-income countries plays a significant role in overcoming food insecurity and poverty alleviation (Altshul, 1998). Farmers are able to increase marketable surpluses and production yield through participation in a well-functioning agricultural market (UNCTAD, 2015).

Market participation consists of demand and supply i.e. smallholder farmers can either participate in the market as a seller or as buyers based on the optimization theory where households intend to maximize utility concerning a cash budget and the readily non-tradable resources (Musah *et al.,* 2014). More so, market participation is a two-way decision-making process, household decides to participate or not to participate in the market and also establish how much to sell (Heltberg and Tarp, 2002). Households decision to participate in the market is constrained by several micro and macro-economic factors. The factors range from socio-economic characteristics (gender of household head and age), natural factors such as land fragment and rain, socio capital like farmers cooperatives, market factors such as market experience and price information as well as institutional factors such as credit service and availability of extension services.

There is a need to understand the different factors influencing market participation among smallholder farmers inorder to discern approaches that will help to facilitate an increase in household market participation. According to Arias *et al.* (2013) market participation by smallholder farmers is heterogeneous and can be viewed from three main spectrum (a) households access to productive assets such as capital, natural resource and labour in line with their subsistent need that influences their willingness and capability to boost production for market sales (b) functionality in the most indigenous market that smallholder farmers operate in are volatile as a result of poor transaction volume and limitation to integrate with other provincial, regional and transnational market, thus restricting the market strength to change demand and limit supply shocks; lack of market integration diminish returns to increase outputs in the event of sudden price fall, thereby affecting market participation incentive. Lastly, connecting farmers to various markets with regards to geographical proximity, transaction cost, power relationship and knowledge asymmetries will modify the incentive they receive. Furthermore, Hlomendlin (2015) classified market participation among household into three categories as seen in the structure below.

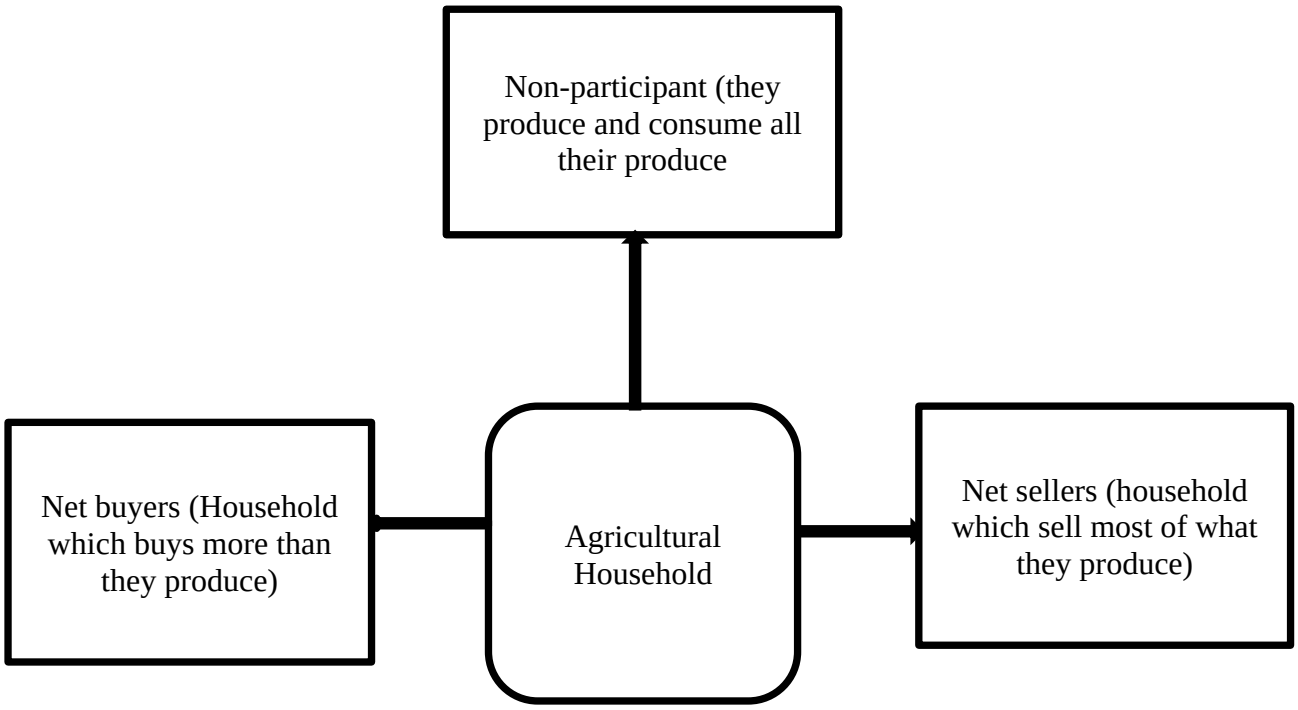

Figure 3: Category of household based on market participation

Source: Hlomendlin (2015)

2.10 Overview of market participation of smallholder farmers in Asia and Latin America

Reducing poverty among smallholder farmers will require an increase in market participation through which profitability, sustainability and productivity can be maintained. Globally, market participation by smallholder farmers varies significantly in size, institutional setting, geographical location, power relation between market actors, nature of the market and the degree of market integration with other regional, local and transnational markets (Arias *et al.,* 2013).

Smallholder farmers are widely represented by marginalization due to their inability to participate in a high-value market. For instance, in Bangladesh, household farmers who participated in the market had a 57 percent increase in sales of crop production (Osmani and Hossain, 2015). However, as stated by the authors, the commercialization process of smallholder farmers in Bangladesh through market participation is still constrained by the absence of technology, poor infrastructure, lack of market links, institutional challenges as well as improper policies. Also, farm income, farm size and household labour were all found to have a significant impact on household decisions to participate in the market (Osmani and

Hossain, 2015). Similarly, market participation among smallholder farmers in Papua New Guinea is greatly influenced by the cost of transport, distance to market and transaction cost associated with organizing production, searching for an available market and negotiation (Wickramasinghe *et al.*,2014).

Increased market participation among smallholder farmers poses a comparative benefit in agricultural production and also will foster rural development. Osmani and Hossain (2015), argue that increasing farm size, farm income and household labour will enable farmers, especially rural dwellers in Bangladesh to increase the extent to which they participate in the market. Following d'Hotel *et al.* (2011), the integration of smallholder farmers in Costa Rica to the agricultural market is determined by several endogenous and exogenous factors such as transaction cost, absence of trust in the agricultural value chain, structural factors and price uncertainty. As alluded by the authors, implementing policies to support standards and grades (G&S) along with contract farming will play an instrumental role towards reducing transaction cost and also provides a better institutional market environment for increased market integration of smallholder farmers. In Indonesia and India, market participation among smallholder farmers is consolidated by organized structures, networks and backed by a traditional relationship and informal system (Patkar *et al.,* 2012).

Policy strategies and interventions targeted at fostering increased market participation of smallholder farmers need to take into consideration the heterogeneity existing within this group (Arias *et al.,* 2013). Furthermore, to achieve these policies and interventions towards increasing market participation by smallholder farmers, there's a need to establish a sustainable and enabling environment for better incorporation of households to market through transparency, improve governance, enhanced infrastructures, availability of market information, stable policies, risk management tool and international trade policies (Arias *et al.,* 2013). Government and stakeholders can establish public procurement schemes directed at creating several market opportunities that will increase market participation through linking farmers to market such as the case of the Food Purchase Programme (PAA) in Brazil which reduces market entry risk and uncertainties (Arias *et al.,* 2013).

2.11 Overview of market participation in sub-Saharan Africa

Increasing market participation among smallholder farmers in sub-Saharan Africa is one of the major challenges confronting government and non-government institutions (Adenegan *et*

al., 2012). In South Africa for instance, smallholder farmers, especially in the sunflower industry are faced with limitations of participating in the market economy due to marginalization, thus larger commercial farms are gaining more momentum in profitable farm operations (Anim *et al.,* 2008). Similarly, market participation by smallholder households in Tanzania is relatively low due to constraints such as high transaction cost of market entry (Mmbando, 2014). Low market participation has led to a low volume of beans traded in Rwanda causing limitation to meet national and transnational demands (Mbitsemunda and Karangwa, 2017).

In the 1980s and early 1990s, most governments in sub-Saharan Africa enacted structural adjustment and market liberation schemes intended to foster opportunities in the new market economic growth and to boost small-scale agriculture. This scheme involved the launching of new markets, removal of the commodity board, upgrading domestic market to meet international standard, removal of government control and de-regularization to encourage private sector investment (Zamasiya *et al.,* 2012). Ironically, this effort has so far yielded ambivalent outcomes whilst the general purpose was to enhance household market participation in functioning markets (Dorward *et al.,* 2004).

The desired agricultural growth required to overcome market participation constraints, food insecurity and rural poverty is yet to be achieved. However, Dorward *et al. (*2004), associated the failure of the structural and liberalization programs to three main factors; (a) partial implementation (b) volatile institutional support for development in the private and market sector (c) superiority of liberalized market in overcoming the low-level equilibrium trap. Several works of literature have indicated that market participation is pivotal towards diversifying household farming practice.

2.12 Factors influencing market participation of smallholder farmers

The decrease in agricultural operations is aggravated by a weak and inefficient market system that has induced poverty among rural households in sub-Saharan countries. Smallholder farmers are faced with a variety of challenges such as poor physical infrastructure, lack of market, high transaction cost, lack of bargaining power, regulatory, technological barriers, lack of market information, human capital, production constraints, lack of business and negotiating experience as well as lack of collective organizational structure which offers farmers a medium

to interact on equal grounds in well-sophisticated markets (Baloyi, 2010). These factors result in a poor term of exchange and influence the production incentives of smallholder farmers.

2.12.1 Transaction cost

Smallholder farmers are predominantly found in rural areas where they are geographically disadvantaged to access high-value markets. Literature indicates that market participation among smallholder farmers in developing nations is characterized by an unstable production trend linked to high transaction costs (TC) as a result of long-distance from rural settlement to high-value markets and among other market constraints. The dilemma is that smallholder farmers are poor with limited assets to compete in high-value markets leading to the inability in meeting the high cost of business caused by poor road infrastructures, distance to market and limited access to information (Baloyi, 2010).

Transaction cost influences the homogenization of agro-processing and agricultural value chains that controls household decisions to choose market outlets. This decision ranges from sourcing and confirming information, bargaining, finding trading partners, product transfer, monitoring, contractual agreements and transaction implementation (Thindisa and Urban, 2018). These factors have been identified as hindrances of market participation that discourages smallholder farmers from commercialization. TC increases the actual price of products purchased while lowering the actual price that farmers get from the sales of that commodity (Mmbando *et al.,* 2015). The situation demonstrates why some households participate in the formal market and others are unable to. Thus, decreasing transaction costs will lead to an improved market access by smallholder farmers.

2.12.2 Marketing Channels

The choice of market outlet is one of the most critical household decisions influencing household income (Mmbando, 2014). The availability of agricultural market channels plays a significant role in market participation among rural households. Market channel decision and choice of market channels determine a household's profitability in agricultural production. Therefore, market channel choice is a crucial decision confronting smallholder farmers with regards to agricultural product marketing because a given market channel choice ultimately affects every other market decision (Berry, 2010).

In South Africa, market channels are inefficient and volatile leading to poor returns on sales of production surplus, thus making farmers to fluctuate at a subsistence level of production (Nxumalo *et al.,* 2019). The cost of transportation, profits, market acquittance and the level of trust among available channels, influences a household's choice in selecting market outlets. The absence of bargaining rights and various credit-bound relationships with buyers are some factors leading to the exploitation of households during transactions, where most farmers end up as price takers (Soe *et al.,* 2015).

The price that farmers receive on produce differs among market channels, which either negatively or positively impact household commercialization (Hill and Fafchamps, 2005). Market channels are downstream sections of the agricultural value chain comprising of chain players at separate outlets where products are made available to consumers (Mmbando, 2014). Nxumalo *et al.* (2019) highlighted three types of the agricultural market channel; (a) formal market channel which functions with regulations, measures and standards, where legal structures are used to outline agreement of transactions. In this case, farmers must abide to the set rules and the products must be up to standard. However, farmers may incur high transaction cost as a result of the inability to meet consumer specifications (b) informal market channels lack regulations, unlike the formal market channels. Here farmers trade directly with consumers and it is the most frequently used among households due to high-profit margin, ease of business and absence of rules. Lastly, (c) non-market or missing market, in this case, there is a market but no access to the available market due to high transaction cost or missing market linkages. Therefore, understanding elements associated with various market channel and factors influencing their selection by smallholder farmers can be used to develop a managerial and interventional policies and when enforced will promote market participation (Arinloye *et al.,* 2015).

2.12.3 Market information

Lack of certain market information and poor market knowledge among smallholder farmers are some of the barriers preventing household commercialization in developing countries. Poor market information is prevalent in sub-Saharan African nations leading to high transaction cost that decreases farm price and make producers victims of information inequality (Fafchamps and Gabre-Madhin, 2006). The effectiveness of the market information system is restricted and hindered by the absence of market actors consideration and limitation on the part of smallholder

farmers (David-Benz *et al.,* 2016). In South Africa, poor understanding of market operations and insufficient market information are vital constraints facing smallholder farmers. Similarly, lack of market information limits a farmers' ability to meet up with market standards and prevailing market price leading to a reliance on middlemen.

Market information is a market tool that leads to better inclusion of producers in the market with regards to boosting market functionality, lowering of uncertainties by dissemination of market information to market actors and the provision of monitoring tools for policymakers (David- Benz *et al.,* 2016; Arias *et al.,* 2013). Farmers are able to make an informed market decisions through the availability of market information with regards to potential buyers, enforcing contracts and monitoring, negotiation and bargaining, demand and supply condition of markets (Jari and Fraser, 2009). The availability of market information is an underlying constituent of market efficiency and when targeted, it will boost market performance via the sharing of information among market players and producers.

Adequate market information has a positive impact on traders, policymakers and farmers because the availability of market information enables farmers to negotiate with consumers from an advantageous position and also facilitate spatial circulation of products from rural settlement to the urban area and between urban markets by conveying a clear price indicator from urban consumers to rural producers with regards to varieties and quantities required (FAO, 1997). Consequently, the fundamental market information required by smallholder farmers are information on market demand, price, consumer preferences, opportunities, quality as well as market requirements (Soe *et al.,* 2015).

Therefore, investing in the prevailing information communication technology (ICT) through the use of communication gadgets such as phones, television, multimedia mediums, radios and even computers can act as an enabler towards the circulation of market information among rural households (Ugochukwu, 2020). The author reveals that ICT cannot be applied to solve all market challenges facing smallholder farmers but can make a significant impact on household decision making. Communication gadgets will not only increase the avenue of improving market participation among smallholder farmers but will lead to increased household income. The emergence of mobile phones has shown a positive impact on modernization, dissemination of information in rural areas therefore it can be useful in enhancing market performance (Jensen 2007; Aker 2010). Through access to market information, smallholder farmers can increase market knowledge thereby influencing their market participation decision (Zamasiya *et al.,* 2014). Also, the availability of market

information enables farmers to make informed market decisions with regards to market supply and demand conditions as well as in the during bargaining and negotiationing with other market actors (Jari and Fraser, 2009).

2.12.4 Access to market

Access to the agricultural market is crucial to boost and expand rural livelihood and household income. However, access to high-value markets poses a significant challenge to rural farmers. One of the primary reasons why smallholder farmers with surplus production outputs remain entangled in poverty is due to lack of market access (Maghingxa *et al.,* 2009). Access to lucrative agricultural markets possesses a substantial prospect for smallholder farmers in developing countries. There are three basic elements influencing market access among smallholder farmers: (a) sectoral and macro policies; these are the impact of policies on trade and price incentive which affect market access, (b) farmers and farm characteristics; vulnerability situations such as risk encountered, land size and quality, educational attainment, level of technology and stock of other productive assets, consumption needs, resource endowment and household structure (c) external factors; current institution and physical infrastructure that drives the decision to produce surpluses as well as a technological investment such as market, electricity, communication and roads.

In South Africa, smallholder farmers with production surplus are faced with limited access to market and infrastructural facilities (von Loeper *et al.,* 2016). However, this challenge can be overcome by focusing on human capacity frameworks in line with sophisticated community network approach. Linking smallholder farmers to different markets with regards to knowledge asymmetries, geographical proximity, power relationships, and transaction cost play an essential role in modifying household incentives (Poole, 2017). Access to agricultural markets can be enhanced by government and relevant agencies using the available value chain structure through supporting household group actions and co-ordination (Ortmann and king 2007). Thindisa and Urban (2018), advanced that a pre-harvest contract agreement is also useful to facilitate market access among smallholder farmers. As posited by the authors, a formal market contract offers market specifications that present farmers with mediums to engage prospective buyers in a pre-agreed upon condition through establishing an advance market channel, price of produce, volume, quality, and expected date of delivery.

2.12.5 Social capital

Social capital is an alluring complex concept that has gained eminent attention among researchers. Social capital also known as farmers' groups is defined as a collective action taken by individuals who invest energy, resources and time to pursue shared goals and objectives (Markelova *et al.,* 2009). The concept of social capital came into attention in the late 1980s and has triggered prominent research interest (Bhandari and Yasunobu, 2009). Studies have suggested that there is no single or universal definition of social capital despite the availability of sizeable literature, since most authors measures and define social capital in a pragmatic and unsystematic manner.

In support of the conceptual weakness and abstract ambiguity of social capital, most author's definitions are afflicted by a lack of invariability with regards to indicators and manner used to estimate the element of social capital (Harper, 2002). Study on the impact of social capital among smallholder farmers' behaviours remains inconclusive, despite the overwhelming benefits of social capital in regards to improving market participation. Notwithstanding, social capital is vital in areas such as growing social cohesion, improved civic engagement, rendering of access to significant information, lowering activities of opportunistic behaviours, decreasing transaction cost, handling collective problems, improving government responsiveness as well as a source of insurance against uncertainties and agricultural risk (Bhandari and Yasunobu, 2009).

In hindsight, there are three distinctive interrelated types of social capital : (i) structural social capital, this deals with social interactions as evidence that individuals possess a set of desired knowledge (ii) relational social capital, this relates to trustworthiness and truth, which is used as a benchmark for exchange in a given relationship, (iii) cognitive social capital; this is a situation where a shared vision is gained inside a developed and sustained relationship (Ya-Fang *et al.,* 2018). Most researchers use social capital to interpret the influence of market participation among smallholder farmers. Social capital like producer's association enables households to switch from non-market participant to formal and informal market participant because they provide a medium for exchanging information that reduce fixed transaction cost and also connects farmers with buyers at a lower cost (Jari and Fraser, 2009).

In Asia, social capital has been useful among smallholder farmers when it comes to accessing the market and in the use of public services. For instance, in 2005 smallholder farmers organization such as the Indian Dairy Cooperative had over 12.3 million members contributing

22 percent of the total milk produced in India (Thapa, 2010). Similarly, in Indonesia, social capital was found to be the major catalyst used in determining the success of forest management to mitigate climate change (Saptutyningsi *et al.*, 2019). The frequency and membership of groups in market participation were also instrumental in the adoption of conservative tillage technology in Ethiopia (Petros, 2010). In the same accord, the National Federation of Coffee Growers in Colombia which mostly consists of smallholder farmers provided market and production services for over 500 000 coffee farmers and has also contributed to their education, infrastructure, and public health sector (Thapa, 2010).

Farmers association plays an essential role in market participation and the extent of market participation. It creates avenues that allow farmers to connect with buyers and exchange information on their product, thus leading to reduction of fixed transaction costs (Mmbando, 2014). In contrast, Apind (2015) revealed a negative relationship between social capital and market participation. The author posited that participation in the group market had a remarkable and negative influence on the extent of market participation; meaning farmers who sold their produce as a group, sold less output than those who sold individually (Apind, 2015). In sub-Saharan Africa, co-operatives organizations among smallholder farmers are constrained by vulnerabilities such as susceptible capitalization, underperformance due to poor management systems, technical capacities and other problems emanating from internal conflict within individuals and their collective interest (Ortmann and King, 2007).

Against this background, it is instructive to note that most cooperatives in rural settlements are vulnerable due to structural leadership and government high-handedness toward smallholder farmers. However, for cooperatives to achieve a maximum height of purpose, there is a need for government interventions and agricultural actors to support in increasing the competitiveness and service delivery to members. For social capital to be fully successful there's a need for critical political institutions and rule of law (Fukuyama, 1995). Several works of literature have also revealed that membership in a group increases farmers ability to access market information, trust from others and also influences the extent to wish they participate in the market. Ultimately, collective action among producers through agricultural co-operatives and farmers' organization is vital towards increasing households bargaining powers which reduce transaction costs (Soe *et al.*, 2015).

2.12.6 Infrastructure

Infrastructure is a canopy for several agricultural vital activities required for industrial and the overall nation's economic growth (World Bank report, 2004). However, high transaction as a result of poor infrastructure is a major challenge restricting the growth of smallholder farmers, particularly in the former homeland region of South Africa (Chaminuka *et al.*, 2008). Infrastructural investment is critical towards reducing transaction costs for smallholder farmers (von Loeper *et al.*, 2016). The availability of improved infrastructure such as road, energy, water, market, transport and information controls household market decisions.

In South Africa, the absence of adequate access to agricultural infrastructure such as trading facilities, abattoirs, storage and processing facilities restrict market participation among household farmers. Similarly, lack of on-farm and off-farm infrastructural development such as roads, poses a significant challenge to small-scale farmers in accessing agricultural markets (Mazibuko, 2018). As indicated by Pinstrup-Andersen and Shimokawa (2006), agricultural productivity relies chiefly on good infrastructure, access to suitable technology, appropriate institution and functioning local markets. Nonetheless, infrastructural development varies widely among developing nations with the lower developing nations having the most critical infrastructure paucities (Mazibuko, 2018). There is a two-dimensional relationship between agriculture and infrastructural development i.e., infrastructural development encourages rural and agricultural development, while development in the agricultural system fuels infrastructural development (Jari and Fraser, 2009).

There are two kinds of infrastructure: firstly, social infrastructure that is activities with direct and indirect impact on household welfare stimulating education, cultural standards, and health of the people such as hospitals, theatres, schools, clinics, universities, court and libraries and economic infrastructure which primarily encourages economic activities such as railroads, seaport, roads, water supply, silo and electricity (Mazibuko, 2018). The absence of these factors limits smallholder farmers response to supply incentives of agricultural marketing and production (Jari and Fraser, 2009). In South Africa, high transaction costs, distance to market and poor road conditions are factors hindering smallholder farmers from increasing their market access (Chaminuka *et al.*, 2008). As a consequence, this has led to high transaction costs causing low market participation, which compels farmers to a "spot market system" where they trade their produce with less regard to profits.

In South Africa, government intervention to enhance the quantity and quality of rural infrastructures through initiatives such as Consolidated Municipal Infrastructure programmes (CMIP), Comprehensive Agricultural Support Programme (CASP), Community Based Public Work Programmes (CBPWP) and Poverty Relief and Infrastructural Investment Fund have not yielded the expected outcome on smallholder farmers (Jari and Fraser, 2009). Therefore, improving infrastructure, most especially in the rural communities is vital to reduce income inequalities and rural poverty (Chaminuka *et al.,* 2008). Additionally, the accessibility of agricultural output and inputs will facilitate household infrastructural usage thereby increasing productivity. Reliable and suitable infrastructure offer physical connectivity of diverse inputs required for economic functionality (Cloete, 2010).

2.12.7 Contract farming

Smallholder farmers are faced with market participation challenges due to poor production surpluses and inconsistent supply level to satisfy contractual arrangements with buyers as a result of production and price constraints (Arias *et al.,* 2013). Smallholder farmers are unable to take advantage of market connection thus they support action that encourages contractual agreement with buyers as a means to decrease market-related risk and to ease transaction cost (d'hotel *et al.,* 2011). A contractual agreement is also known as contract farming (CF), it is the process of providing production services, fertilizers, seeds and technical assistance such as guaranteed commodity price at harvest and access to finance which controls household risk, productivity, credit, information and input (Miyata *et al.,* 2009). Thus, CF has the potential to link smallholder farmers with other major markets of high-value produce and has gained prominence in several LAC and Asian countries (Thapa, 2010).

CF is defined as the growing and marketing of produce under agreed terms where grade, size, price, inspection and timing are specified to both grower and processor before production (Bijman, 2008). Besides, it can be said to be a system in which arrangements are made in advance to purchase farmers' commodities on a contract basis by a central exporting or processing unit (Baumann, 2000). It can also be described as a form of vertical linkage within agricultural product chains in ways where a company poses greater influence and control over the process of production in terms of quality, quantity, characteristics of products and timing of production (Prowse, 2012). There are three types of contract; resource providing contract, production management and market specification contract (Bauman, 2000).

Studies have shown a significant impact of CF on household income in Indonesia, India and China (Bijman, 2008). One such case is the India Dairy contract farmers, where the gross profit margin was double in contrast to independent dairy farmers due to lower marketing and production costs for those on contract (Birthal *et al.,* 2005). Similarly, Miyata *et al.*(2009), reveals that there was a significant difference in the profit earned among farmers on contract and independent farmers of Shandong province, China. Consequently, the major factors leading to these differences were high yield returns, technical assistance received, high price recieved and the access to inputs (Thapa, 2010). Contract farming is a way of assigning risk between contractors and farmers.

In hindsight, Eaton and Shepherd (2001), highlighted five different models of contract farming which differ in terms of product type, numbers of stakeholders involved, types of contractors and the intensity of the vertical co-ordination between contractor and households. They are (a) the nucleus estate model; where contractors own production facilities like an estate plantation and also source produce from independent farmers (b) the classical model also referred to as the centralized model; where processors purchase commodities from large numbers of households. In this model, qualities and quantities are strongly controlled and determined at the start of growing seasons (c) the multipartite model; this model is common in China and was adopted among several governments in developing countries during the 1980s and 1990s market liberalization; where a joint venture between a statutory organization and private companies contract farmers (d) the intermediary model, this CF system involves at least three factions (a processor formally establishes contracts with middlemen who are charged to contract local farmers informally) and is common in South East Asia (e) lastly, the informal model, this is a situation where small companies or individual entrepreneurs informally contract farmers on seasonal basis (Eaton and Shepherd, 2001).

The foundation of contractual agreement is associated with a farmer's commitments to provide commodities based on specifications of quality and quantity standards; that is defined by the contractor and also a commitment on the side of the contractor to support production and purchases of the farmers' commodity (Bijman, 2008). However, there are some pullbacks in contract farming like high transaction cost for smallholder farmers, high rate of commodity rejection by traders and agro firms, poor bargaining position as a result of limited traders, weak enforcement of contracts, poor commitments and strict consistency demands i.e. no variation, food safety, quality, due diligence as well as ethics and business attitude referring to delayed payments or reduced payments or non-payments (Kirsten and Sartorius, 2002; d'Hotel *et*

al., 2011). Therefore, for contract farming to succeed, there is a need to take cognisance of several factors like policies, a good term of agreements, proper screening and representation of interest between partners and farmers during contract negotiation, mutual trust in contractual relations and a properly managed/developed legal system (Kirsten and Sartorius, 2002).

2.12.8 Chapter outline

The chapter presented some of the key concepts of the study such as `global and domestic sunflower production, sunflower supply and demands in South Africa, sunflower value chain in South Africa, stakeholder relationship, an overview of smallholder farmers in sub-Saharan Africa, Asia and Latin America, market participation of smallholder farmers in sub-Saharan Africa, Asia, and Latin America as well as the factors influencing market participation. The next chapter presents the research methodology.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Introduction

The methodological approach used in the study is described in this chapter. It also presents a detailed picture of the geographical area where the study was conducted. The chapter highlights the technique used in the empirical data analysis as well as the map of the study area, research design, data collection method (population, sample size, sampling technique, key informants, primary and secondary data, and the data collection tool) as well as the econometric model employed for the empirical data analysis.

3.2 Study Area

The North West Province is home to Bojanala Platinum, Dr. Kenneth Kaunda, Dr. Ruth Segomotsi Mompati, and Ngaka Modiri Molema Districts. The province is South Africa's second-largest producer of sunflowers, which in 2018 accounted for 326200 tons of the total sunflower crop produced on 233000 hectares of land (DAFF, 2019). However, the research was limited to Ngaka Modiri Molema District. According to reports, between 2010 and 2016, the district had the highest share of sunflower seed exports, with other comparable districts accounting for only a small portion (DAFF, 2019). Precisely, in 2014, the district accounted for approximately R2000000 in value of sunflower seed exports from North West province.

The district covers an area of approximately 28 114km² with a population of 889 108 (North West community survey report [NWCS] 2016). Ngaka Modiri Molema District Municipality is one of the four districts found in the North West Province and is called a Category C municipality. The district is centrally situated within the province and shares an international border with Botswana. In 2016 the district accounted for roughly 17.4 percent of the provincial gross domestic product (NWCS, 2016). The main contributing sector in the district include community services 36.5 percent, finance 15.3 percent, trade 14 percent, transport 8.6 percent, manufacturing industry 6.6 percent, tourism 5 percent, and agriculture 4.9 percent respectively (NWCS, 2016). The district is a home to Mahikeng (previously Mafikeng), the capital of the province nicknamed ‘'The City of Goodwill", which is also the city's slogan. It is a rapidly growing, modern, residential, administrative and commercial town with a fascinating history.

The district comprises a fairly flat dry area to the west, with the east becoming bushveld and home to five local municipalities; Mahikeng, Ratlou, Ramotshere Moiloa, Ditsobotla and

Tswaing with the following towns: Coliny, Disaneng, Groot Marico, Zeerust, Mehikeng, Ottosdal, Mmabatho, Sannieshof, Ottoshoop, Setlagole, Lichtenburg, Kraaipan, Delareyville, Biesiesylei, and Madibogo.

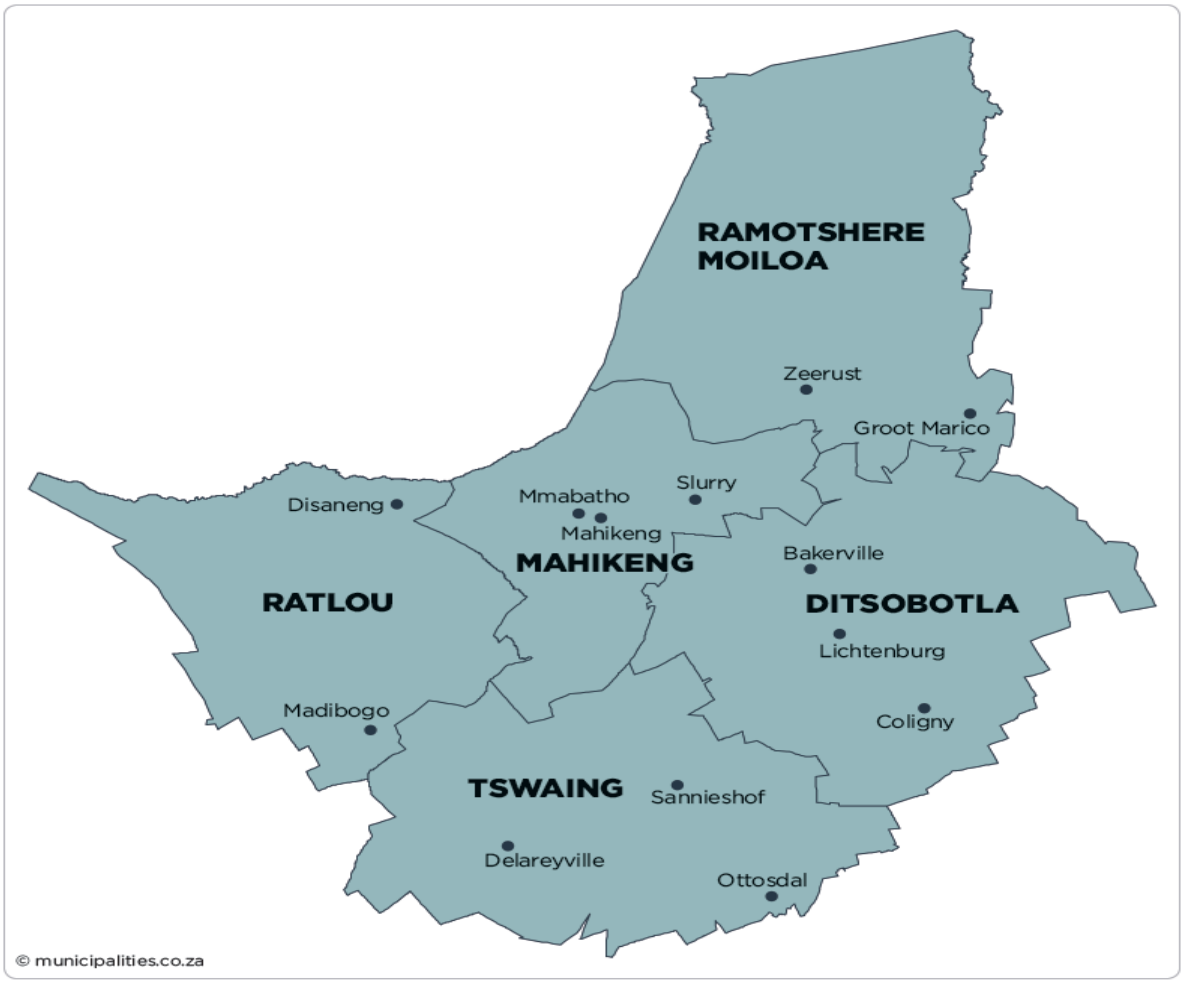

Figure 3.1: Map of Ngaka Modiri Molema District and various towns
Source: https://municipalities.co.za/provinces/view/8/north-west

3.3 Research Design

The overall strategy used to conduct research is know as research design. It is a concise and logical technique for addressing specific research questions and objectives through data gathering, interpretation, analysis, and discussion. Polit and Beck (2004) posit that a survey's research design highlights the researcher's practical steps for addressing the research questions and objectives. It is a method of gathering measurable data or generating numerical data that can be transformed into useful statistics. It served as a blueprint for data collection,

measurement, and analysis. The research design organizes the survey modalities to show how all of the primary components work together to answer the various research questions. The study uses quantitative and descriptive research methods, as well as a cross-sectional research design.

3.4 Data Collection

Authorization for data collection was obtained from the District Department of Agriculture and Rural Development before data was collected. Subsequently, local chiefs and enumerators were consulted and questionnaires were administered to obtain demographic, farm and institutional information from respondents. Questionnaires are cheap, efficient and quick way to obtain an infinite amount of information from a population group. It is an effective tool to collect data through a semi-structured interview. The purpose of a semi-structured interview is to provide information in a standard way that allows the participants to fully express their response in line with the questionnaire items. This was performed to allow the researcher to compute and numerically reflect the responses from the sample subject and to perform data analysis. Also, the questionnaire was considered appropriate for data collection in this study as it would provide meaningful empirical information based on the research question.

The questionnaire was designed with both open and closed-ended questions to analyse and compare responses. The opened ended question provided an avenue for the participants to freely express their intra-personal experiences, understanding, opinions, knowledge and interpretations of their prevailing situation. This was done by the researcher to negate the irregularities of responses. The medium also offered less avenue for bias as interviews were carried out by trained enumerators under the supervision of the researcher. Each session of the face to face and group interviews conducted in the four local district municipalities lasted about an hour per session.

3.5 Population, sampling technique and sample size

Ngaka Modiri Molema District Municipality is one of four district municipalities in the North West Province, consisting of five local municipalities: Mahikeng, Ratlou, Ramotshere Moiloa, Ditsobotla and Tswaing. The target population was smallholder sunflower farmers in the Ngaka Modiri Molema District Municipality. Mazibuko (2018) describe population as a total units or complete total cases or elements that include objects, events, or individuals for whom observable information may be obtained. The key informants are smallholder sunflower

farmers in the district. The district was purposefully selected because of its large sunflower contribution within the province (BFAP, 2016).

Sequel to data collection, a list containing smallholder sunflower farmers was obtained from the District Agricultural and Rural Development office in combination with other list collected from tribal chiefs of different communities.

3.5.1 Sampling technique and sample size

Sampling is a technique for the selection of units in a given population of interest in which the results obtained can be used to generalize the sampled population. It is a method of selecting a population subset with all population features that is consistent with the measurement techniques. The population in this study is heterogeneous, hence the sample size was determined using the proposed formula of (Krejcie and Morgan 1970). The authors posited that a sample size between 30 and 500 are suitable for most quantitative surveys. Furthermore a proportional stratified random sampling technique was applied to select 177 smallholder sunflower farmers from the total population of 221 smallholder sunflower farmers in the district. The method was used to categorize the population from each of the five local municipalities into strata, in which a random sampling method was applied to select respondents from each stratum. However, five of the questionnaires was removed from the final estimation as a result of missing data, leaving the researcher with a total of 172 observation. Table 3.1 shows the actual sample size chosen from each representative stratum in the five-local municipalities.

$$n = \frac{X^2 * N * P(1-P)}{\left(ME^2 * (N-1)\right) + \left(X^2 P \ * \ (1-P)\right)}$$

Where:

n = sample size

X^2= Chi-square value at 95 percent confidence level with 1 degree of freedom (3.84)

N = Population size

P = Population proportion (0.96 percent)

ME = Desired margin of Error express as a proportion (0.05)

From the formula above,

$$n = \frac{3.84 \times 221 \times 0.96 \times (1 - 0.5)}{0.05^2 \times (221 - 1) + 3.84 \text{ X } 0.96 \times (1 - 0.5)}$$

$$n = \frac{407.4}{0.5 + 1.8} = \frac{407.4}{2.3}$$

n = 177 participants

Table 3.0 Data collected according to selected local municipalities

District Municipalities	Population of respondent	Selected sample size
Mafikeng	139	103
Ditsobotla	59	51
Ratlou	10	10
Tswaing	8	8
Ramotshere Moiloa	5	5
	221	177

Source: Author's computation (2020).

3.6 Primary and secondary data

The survey made use of both primary and secondary data. Primary data in this research was collected from respondents through a formal and informal survey using a semi-structured questionnaires. The informal interview was done to obtain exhaustive information in regards to their sunflower production. Data focuses on household demographic, institutional, and market characteristics. A self-administering approach with the aid of two properly trained enumerators was employed to gather data from the respondent. This was done to build a proper rapport with the respondent and to ensure accuracy.

The questionnaire was designed to ensure that the personal information of the participants such as names or identities was not disclosed in any form whatsoever. The questionnaire was divided into sections which correspond to the specific objectives of the study. The sections were drafted in a simple clear and understandable language that is consistent and short to avoid survey fatigue. The researcher was able to use the enumerators to present the questions in the questionnaire to respondents in their native language (Setswana). Secondary data for the study were obtained from various online publications, existing works of literature, statistics, journals, books and research reports.

3.7 Validity and reliability

The drafted questionnaire was sent to the researcher's supervisors for comments and review before data collection was done. Subsequently, the questionnaires were pre-tested by 10 respondents in the target population. These 10 samples were however exempted from the overall study. This was done to ensure reliability, unambiguity, consistency, appropriateness, identification of major flaws and to validate the questionnaire as an efficient data collection tool. The outcome of a pre-tested questionnaire is useful to create internal consistency, validity and reliability of the questionnaire (Mazibuko, 2018). The pre-test aims to detect flaws that require correction and the authentication of the survey instrument for its reliability. In other words, if another person or researcher measures the same variable more than once using the same questionnaire, the odd result will be the same. The research instrument should be able to accurately reproduce the results of the variables being measured. Finally, the questionnaire was evaluated based on face and content validity with the help of friends at post-doctoral level. The face validity checks whether the questionnaire measures the model being tested, while the content validity assess whether there are adequate questions in line with the research objectives and free from unrelated questions.

3.8 Data Analysis

Data analysis is defined as a systematic arrangement, a combination of research data and the use of such data to test the research hypothesis (Polit and Beck, 2010). This study therefore made use of both descriptive and inferential statistics. To ensure consistency, precision, and homogeneity, the data collected from respondents was extensively revised, encoded, and cleaned. Data was entered and captured using statistical computer programs such as Microsoft

Excel, STATA 14. 0, and Statistical Package for Social Sciences (SPSS version 26). The descriptive statistics and correlation coefficients matrix were generated using SPSS. The household commercialization index (HCI) was calculated using MS Excel. Finally, the empirical probit model, marginal effect, multicollinearity, as well as postestimation test were all estimated using STATA 14.0.

3.8.1 Objective 1

To achieve this objective, descriptive statistics such as a frequency distribution table, mean, percentage, and standard deviation were used. This was used to analyze the respondents' socioeconomic characteristics.

3.8.2 Objective 2

The level of market participation of smallholder sunflower farmers was determine using household commercialization index (HCI). Following Osmani and Hossain (2015) respondents having household commercialization index of 75 percent and above are regarded as market participants, while those below the threshold level of 75 percent are said to be non-market participants. The total quantity of sunflower sold from the total volume of sunflower produced in the 2019/2020 crop season was used as a proxy measure for market participation. Note market participation in this study is defined by a discrete choice variable rather than a continuous variable due to the empirical probit model used to attain the objective. The HCI is expressed below.

$$HCI = \frac{Total\ value\ of\ sunflower\ sold\ in\ ith\ season}{Total\ value\ of\ sunflower\ produced\ in\ ith\ season} \times\ 100$$

Where:

$\boldsymbol{HCI}$ = The $i-th$ farmer commercialization index for Sunflower farmers. It is a proxy measure used to calculate the level of market participation of smallholder sunflower farmers.

Numerator = Total amount of sunflower sold by the i^{th} farmer in 2019/2020 season

Denominator = Total value of sunflower produced by the j^{th} farmer for 2019/2020 season.

3.8.3 Objective 3

To determine the factors that influence households market participation in the study area. This objective was analysed using inferential statistics such as the Probit regression model. The probit regression model is used to estimate the effect of behavioural and risk factor variables having a dichotomous outcome. The probit regression model is a multivariate technique that can be used to handle the relationship between a dichotomous endogenous variable with one or more regressors. The model is particularly appropriate when trying to model a dichotomous dependent variable. A Probit regression model was therefore used in this research to identify those factors as well as to examine the relationship between market participation and factors that influencing market participation. Assuming that the response variable Y is binary, this means that it can only take two outcomes represented as 1 and 0. *Y* may indicate yes or no in a given study and also the vector of the regressor, which is presumed to control the outcome of Y. Clearly we can assume that the model takes the form of:

$$\Pr(Y = 1 \mid X) = \Phi\,(X^{\mathrm{T}}\beta) \qquad 3.1$$

Where Pr, represent probability and Φ is the cumulative distribution function (CDF) of the standard normal distribution. The maximum likelihood usually estimates the parameters β. Therefore, the probit model can be regarded as a latent variable model, assuming that there is a presence of an auxiliary random variable. Thus:

$$Y = X^T\beta + \varepsilon \qquad 3.2$$

Where $\varepsilon \sim N\,(0, 1)$. Then Y can be regarded as an indicator, if this latent variable is positive given;

$$\begin{Bmatrix} 1 & Y* > 0 \\ 0 & Otherwise \end{Bmatrix} = \begin{Bmatrix} 1 & X^T\beta + \varepsilon > 0 \\ 0 & Otherwise \end{Bmatrix}$$

Normally, using the standard normal distribution causes no form of generality loss unlike the normal distribution with an arbitrary mean and standard deviation. Since the addition of a fixed amount to the mean can be compensated by subtracting the equal amount from the intercept

and multiplying the standard deviation by a fixed amount that can be compensated by multiplying the weights by the same amount.

a. Probit model specification

The model hypothesis is that there exists some probability of an event, that is participation in the sunflower market at any given circumstance by smallholder farmers in the study area is a function of several socio-economic and institutional variables. In this study, participation in the sunflower market means whether a farmer's sales proportion in the output market is equal to or greater than the 75 percent threshold level as indicated in objective two i.e., (sales proportion from the total sunflower crop produced for i^{th} year is ≥ 75 percent) following (Osmani and Hossain, 2015). The dependent variable takes the form of binary response, where 1 denotes households that are participating in the sunflower market, while 0 if otherwise (households did not meet the threshold level). The binary response variable was defined by the researcher as $Y = 1$, if the proportion of sunflower sold by farmers in the production year exceeds the threshold level of $Y^{*}(75\ percent)$, and $Y = 0$, *if* $Y \leq$ *75* percent. Below is the specification of the empirical probit model used in the analysis.

P1= P (Y=l) = Q (Xi, e) (i=l, 2.....n) .....(3.3)

The model assumed that the probability of i^{th} farmers participation in the mainstream sunflower market *P (Y= l),* is a function of explanatory variables *X*, shown and the unknown parameter vector (e). Thus, it is expressed as follows when the variables are fitted into the model:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_{16} X_{16} + \varepsilon_i \quad (3.4)$$

$$Y = \begin{cases} 1 \ if \ y^{*} > 0 \\ 0 \ if y^{*} \leq 0 \end{cases}$$

Where:

Y = Binary response variable defined as

β = Estimated parameters

X_1 = Gender of household head

X_2 = Age of household head

X_3 = Household size

X_4 = Farmers education level

X_5 = Access to Extension Agent

X_6 = Land tenure system

X_7 = Distance to market

X_8 = Access to information

X_9 =. Cooperative Access

X_{10} = Access to credit

X_{11} = Access to input

X_{12} = Grant/subsidy

X_{13} = Market outlet

X_{15} = Transportation Ownership

X_{16} = Quantity sold

β_o = Intercept

ε = Error term

b. The marginal effects

The marginal effects are the expected changes in the probability of market participation due to a unit change in the explanatory variable. It is normal to report the marginal effects after the coefficients when estimating probit models. Since marginal effects are dependent on *X*, it is proper to assess marginal effects at a given value of *X*. They are also called marginal probabilities which are the product of the probability itself and they predict the observed changes in the likelihood that a particular choice will be made concerning a unit changes in an exogenous variable from its average value (Green, 2000). The marginal effects for the proposed model specification are described as a change in the predicted probability attributed to a percent change in the explanatory variables. It explains the partial change in the probability and it is specified as follows;

$$\frac{\delta p}{\delta x_{ijk}} = \emptyset(X_i'\beta)\beta_{jk}, \quad \text{.....(3.5)}$$

Where ∅ indicates the probability density function of the standard normal variables

Table 3.2 Definition of Hypothesized Effects of Explanatory Variables on Market Participation for the empirical probit model (n = 172)

Variable codes	**Types**	**Description and values**	**Expected signs**
MKT_PART (Y)	Binary	1 = Market participant, 0 = Non-market participant	±
		Independent Variables	
Gender (X_1)	Binary	Gender of household head 1 = Male, 0 = female	+
Age (X_2)	Continuous	Age of household head (in years)	+
HSize (X_3)	Continuous	Household size (Number)	−
Edu (X_4)	Binary	Education of household (1= Educated, 0 =Not educated)	+
ExtAcs (X_5)	Binary	Access to extension service (1 = Yes, 0 = No)	+
LandTen (X_6)	Binary	Land tenure system (1 = Communal, 0 otherwise)	±
MktDist (X_7)	Continuous	Distance to market (Kilometers)	−
InfoAcs (X_8)	Binary	Information Access (1 = Yes, 0 = No)	+
FarmYrs (X_9)	Continuous	Farming Years (in year)	±
CoopAcs (X_{10})	Binary	Cooperative Membership (1 = Yes, 0 = No)	+
CrtAcs (X_{11})	Binary	Access to credit (1 = Yes, 0 = No)	±
InputAcs(X_{12})	Binary	Access to input (1 = Yes, 0 = No)	+
GrantAcs (X_{13})	Binary	Access to grant/subsidize (1 = Yes, 0 = No)	+
MktOut(X_{14})	Binary	Market outlet (1 = Nwk, 0 = Otherwise)	+
OwnTrans (X_{15})	Binary	Transportation ownership (1 = Private, 0 = Hired)	+
TonsS (X_{16})	Continuous	Quantities sold in tons	+

Source: Author's computation (2020).

c. Predicted probabilities and goodness of fit measures

It is necessary to predict the probability that y = 1 for each observation after estimating the probit regression model.

$$\hat{p} = pr[y = 1|x] = F(X'\hat{\beta})$$

The predicted probabilities are limited between 0 and 1 for the probit model. Thus, the predicted probability indicates the likelihood of y =1. If the predicted probability is greater than 0.5 we can predict that y=1, otherwise y = 0

3.9 Limitation of the study

The main limitation of the study is that the outcome cannot be used as a premise for generic assumption of reality in the entire province as data were gathered from a single district in the North West Province of South Africa. The district is mainly known for its high production of sunflower within the province. However, it will be unwieldy and capital exhausting to carry out the research in the entire province or country as a whole, which led to the choice of a district. The study was limited to one district and surveyed samples were gathered from March to October 2020. A further drawback in this report is that some of the respondents were uneducated. As such, they relied on their memory to provide information, and information provided through this medium are normally susceptible to error given a lack of properly written records.

3.10 Chapter outline

The chapter provided a detailed summary of the study's methodology. The research concept, sample selection method, and procedures were all explained in detail. The sample size, data collection, data collection technique, data capturing, and data analysis were all described in the same way. The various models and the rationale for their usage in the study were thoroughly explained. The next chapter presents a clear interpretation of the empirical data analysis.

CHAPTER 4. RESULT AND DISCUSSIONS

4.1 Introduction

The chapter presents the descriptive analysis, econometric model used to analyze data as well as the socioeconomic attributes, the level of their market participation, and factors influencing market participation among respondents in the study area.

4.2 Frequency distribution of respondents across the five local municipalities

Table 4.1 revealed that 56.4 percent of the respondents were from Mafikeng local municipality, while Ditsobotla, Ratlou, Ramotshere Moiloa and Tswaing accounted for 32.6 percent, 4.7 percent, 1.7 percent, and 4.7 percent respondents, respectively. This signifies that the bulk of sunflower farmers in the districts are in Mafikeng; however, this is not surprising because households in the provincial capital (Mafikeng) are expected to have access to better farm amenities and opportunities to partake in the market economy.

4.3 Distribution of respondents by gender of household heads

Table 4.1 shows the gender distribution of respondents in the study area. It reveals that 79.1 percent of respondents were male household heads. This indicates a lack of women's participation in the sunflower industry in the study area. The findings shows that male-household heads are more involved in sunflower production in the study area than female household heads. Mmbando (2014) and Apinad (2015) finds that male household heads have more tendency to participate in farming activities than female household heads as a result of historical-cultural marginalization and lack of access to productive assets such as land, labour, and capital which limits their production capacities. In several sub-Saharan Africa nations, female household heads are faced with social-cultural inequalities, unequal allocation of resources and privileges among gender. Other studies have also attributed this low market participation among female household heads in rural areas to other household factors. Gender dynamics need to be promoted in the sunflower industry to foster proper competitiveness and increase market participation among rural female headed households.

4.4 Distribution of respondents according to marital status

Table 4.1 indicates that 61 percent are married, whereas single, divorced, widowed, separated accounted for 21.5 percent, 2.9 percent, 9.3 percent and 5.2 percent of respondents. Married household heads are more likely to be saddled with social and economic responsibilities that stimulate decisions to increase production for extra income, thus influences the degree to which they participate in the market. Accordingly, married household heads are more likely to engage more actively in the market to meet social and economic obligations (Alkali, 2017). Equally, Oduniyi (2018), asserted that married household heads are more engaged in farming activities than unmarried household heads.

4.5 Distribution of respondents by age of household head

Age distribution as presented in Table 4.1 shows that the average age of respondents is 52.55 years. There appears to exist a lack of youth involvement in smallholding sunflower farming in the study area. The dearth of youth involvement in sunflower production in the study area could be attributed to factors that includes but not limited to absence of awareness, limited access to land and adequate finance, as well as lack of experience. As a consequence, they tend to engage in other non-farming activities. This is similar to Mazibuko (2018) and Oduniyi (2018) reports, that youth in the study area are uninterested in farming activities and are involved in other non-farming sectors such as information technology, civil services and mining. However, older farmers in the study area tend to have better access to production factors and are presumably well experienced to assess farm risks and uncertainties.

4.6 Respondents distribution according to household size

The average household size found in the study area as indicated in Table 4.1 is 5.76 members. This could be that a larger household size sometimes serve as a medium of manual labour for farming operations (Oduniyi, 2018). Similarly, Martey *et al.* (2012) posited that farmer's production abilities are influenced by the number of members per household supply in the form of farm labour. On the contrarily, Mwema *et al.* (2013) opined that the level of market participation is negatively influenced by large household sizes since most of the produce will be kept for household consumption. Nonetheless, the household size juxtaposes the average household size of 3.3 members found in South Africa as reported in 2016 statistics (Lehohla, 2016).

4.7 Distribution of households by level of education

Table 4.1 shows that 89.9 percent of respondents in the study area had some level of schooling, compared to 46 percent found by Nxumalo **et al**. (2019) in their study of market channel determinants in the North West Province of South Africa. Household heads with formal education are more cognizant and abreast with prevailing farm innovations, operations and can better interpret current market dynamics. Barmire et al. (2002); Asfaw and Admassie (2004) stated that a farmer's capacity to produce given any resources, largely hinge on information and education level he/she had attained. Household heads with a higher level of education are better able to comprehend and implement new agricultural production-boosting innovations (Nwaiwu et al., 2012).

4.8 Distribution of respondents by occupation

Table 4.1 reflects that 69.8 percent of respondents are involved in full-time farming with 7.0 percent part-time farmers, while 7.0 percent are employed, 7.6 percent own a business, 7.6 percent retired and 1.2 percent are students. This means that the majority of respondents derives their income and means of livelihood from sunflower farming. As indicated, only 7.0 percent reported that they obtain their incomes and means of livelihood from non-farming activities. The 7.0 percent comprises of those with employment status using farming as a secondary source of income. This finding signifies that sunflower farming is a major source of income among respondents in the study area. The report concurs with Mgeni *et al.* (2018) findings that the edible oil subsector such as sunflower production presents farmers with numerous opportunities as it produces valuable and essential vegetable oils and oilcake that are sold to both external and internal market.

Table 4.1. Socio-economic and institutional characteristics of respondents

Variables	Minimum	Maximum	Mean	Std.Dev
Age	21	90	52.55	12.324
Household size	0	20	5.76	2.556
Variables		Percent (%)		Frequency
Local Municipalities				
Mafikeng		56.4		97
Ditsobotla		32.6		56
Ratlou		4.7		8

Table 4.1 (Continued)

Ramotshere Moiloa	1.7	3
Tswaing	4.7	8
Household Gender		
Male	79.1	136
Female	20.9	36
Marital Status		
Single	21.5	37
Marriage	61.0	105
Divorced	2.9	5
Widowed	9.3	16
Separated	5.2	9
Education Level		
Educated	89.5	154
Not Educated	10.5	18
Occupation		
Employed	7.0	12
Part-Time Farming	7.0	12
Full-Time Farmer	69.8	120
Business Owner	7.6	13
Retired	7.6	13
Others	1.2	2
Access to Credit		
Yes	19.8	32
No	80.2	138
Access to Grant		
Yes	58.7	101
No	41.3	71
Information Access		
Yes	72.1	124
No	27.9	48
Information source		
Self /Media	22.1	38
Government	38.4	66
NWK	31.4	54
Farmers Group	18.0	31

Table 4.1 (Continued)

Other Farmers	7.0	12
Extension Access		
Yes	79.1	136
No	20.9	36
Extension Frequency		
Very Often	20.3	36
Occasionally	30.2	52
Rarely	28.5	49
Never	20.9	36
Cooperative Access		
Yes	27.3	47
No	72.7	125

Source: Field Survey (2020)

4.9 Distribution of respondents by access to information

Access to production and market information plays a critical role in farm operations. The result in Table 4.1 shows that 72.1 percent of respondents had good access to farm information, while 27.9 percent of the respondents neither have nor receive farming information. The reasons behind this high receipt of farm information cannot be far-fetched because the sunflower crop is a premium cash crop which is sold at a current seasonal SAFEX price. This is complimented as majority of the respondents use a combination of medium to get farm information. The majority of respondents revealed that they access farm information through media, the District Department of Agriculture and other organizations such as GrainsSA, Panner, and Mosanto. This signifies that a majority of the respondent had access to the market and other forms of production information. This aligns with (Mathagu, 2016) report that access of market information by sunflower farmers in Sekhukhune District in Limpopo Province, South Africa significantly influenced the level of their market participation**.**

4.10 Distribution of households by grant and credit access

Table 4.1 indicates that only 41.3 percent of respondents receive grant and input subsidies from the District Department of Agriculture, while the majority comprising 58.7 percent receive neither grant nor subsidy. In the same vein, 80.2 percent of households do not have access to credit, while 19.8 percent had access to credit. This implies that only a few of the respondents

are able to obtain credit from financial institutions. Some also indicated that they receive financial assistance and inputs in the form of grants from the government. Unfortunately, most of the respondents neither receive government grants nor have access to credit. Nonetheless, access to credit and grant are necessities to enhance agricultural production through input acquisition, payment of labours and access to markets.

In most cases, farmers are discouraged from sourcing for credit support due to the lack of collateral and high-interest requirement by financial institutions. Several government programs such as poverty relief and investment funds aim to facilitate farmers' access to finance have all registered limited impact among respondents in the study area. Respondents lack access to finance to purchase inputs, equipment, and farm production asset such as storage facilities. This aligned with Mazibuko (2018) findings, that smallholder grain farmers in South Africa rely in storing their grains on per-ton per-day bases in silos owned by private agribusinesses such as NWK due to lack of finance to procure storage facilities. Furthermore, Martey *et al.* (2012) maintain that lack of access to credit is the foremost challenge facing rural households in Ghana.

4.11 Distribution of households according to extension access

Table 4.1 shows the distribution of respondents by access to extension services and the frequency of contacts. The result reveals that 79.1 percent of the households in the study area had access to extension officers from the District Department of Agriculture and Rural Development (DARD). In terms of frequency of visit, 30.2 percent of the respondent indicated occasional access to extension officers, 27.9 percent rarely get visited, 21.5 percent had frequent contact, and 20.3 percent had no contact despite having access. This signifies that the frequencies of extension contacts is low in the study area despite having extension access. This limits farmers' access to government grants, subsidies and access to enhance farm and market information that affects farmers' production and market participation capacities. Accordingly, frequent access to extension services enhances farmers' market ideas and decision-making concerning farm production risk (Alkali, 2017).

4.12 Distribution of respondents by cooperative membership

As revealed in Table 4.1 about 72.7 percent of the sampled households did not belong to any farmer organizations. While, 27.3 percent of the respondents belong to farmers organizations

such as Grains SA, Africa Farmers Association (AFASA), Merpo, Tremodijo primary cooperative, Reatilegile Farmers Association, Disobotla Farmers Association, National Farmers Union, Lishdileng Bagodi, Mooifontain, Ikgopoleng, Mukasa and Mokhahasi Primary Cooperative. This means that a majority of respondents do not belong to farmers' associations or organizations. Farmer organizations play a significant role in market participation because they serve as mediums for farmers to access production and market information. Belonging to a farmers' association enhances household knowledge of new agricultural technology, tackling pests challenge, climate change information and new farm practices (Saptutyningsih *et al.*, 2019). In support, Poulton *et al.* (2006) and Sigei (2017) reported that belonging to farmer associations increases household negotiating and bargaining powers, thus increasing enhance household market participation.

4.13 Distribution of respondents according to private asset

Table 4.3 shows that 77.9 percent of the respondents own either a truck or trailer and tractor for supplying their produce. While 22.1 percent of the respondents hire transport to supply their produce. Most of the respondents travel between 0 to 30km from farms to market. While 2.3 percent, of the respondent, travels more than 90km. The distance was not much of a challenge among respondents since the majority owns one or more means of transport. About 66.3 percent of the respondents are crop and livestock farmers, while 33.7 percent strictly crops farmers. 85 percent complements their sunflower farming with a combination of either maize, dry bean, groundnut, soybean and wheat. The result collaborates with Mazibuko (2018) findings that most smallholder farmers in North West Province South Africa are involved in a mixed farming system (crop and livestock) as a means to guarantee household food security.

Table 4.2: Farm characteristics of respondents in the study area

Variables	Percent (%)	Frequency
Means of Transport		
Private Vehicle	77.9	134
Hires Transport	22.1	38
Land Tenure System		
Communal	47.1	81
Others	52.9	91
Market Distance		

Table 4.2 (Continued)

0 – 30km	53.5	92
31 – 60km	30.2	52
61 – 90km	14.0	24
Above 90km	2.3	4
Sunflower Farming Year		
1 – 10 Years	51.7	89
11 – 20 Years	27.9	48
21 – 30 Years	16.3	28
Above 30 Years	4.1	7
Market Outlet		
NWK	82.6	142
NWK and Others	17.6	30
Land Size		
Less than 1 hectare	5.8	10
1 – 100ha	54.1	93
101 – 200ha	29.1	50
201 – 300ha	6.4	11
Above 300ha	4.7	8
Farming system		
Dry land	160	93.0
Irrigation and dry land	12	7.0

Source: Field survey (2020).

4.14 Distribution of respondents by farm characteristics

Table 4.3 shows that 50.7 percent of the respondents had between 1 – 10 sunflower farming experience, 29.1 percent had 11 – 20 years of farming experience. While 16.3 percent and 4.1 percent of the respondent had between 21 – 30 years of farming experience, and 4.1 percent had above 30 years of farming experience. As a rule, experience is a factor of time (years) and practice; the more time and years farmers spend in producing a particular crop, the more experienced and conversant they tend to be in terms of the farming operations and market dynamics that invariably influences the level of their market participation.

Table 4.3 also shows that 52.9 percent of the respondents operate on a communal land system. About 47.1 percent of the respondents farm on rented, private and land obtained through land

restitution and proactive land acquisition strategy (PLAS). South Africa as a nation, boost in abundance of vast arable and state-owned land. The state controls the allocation system of land through a communal land tenure system that is governed and managed by tribal/traditional institutions, which bestows landholding rights to traditional authorities such as tribal chiefs and headmen to allocate plots to rural inhabitants without necessarily administering any form of legal ownership or title deeds. A majority (54.1 percent) of the respondent in the study area had between 1 and 100-hectare of farm size, 29.1 percent had between 100 to 200 hectares, 6.4 percent had between 201 and 300 hectares, 4.7 percent had above 300hectares, while 5.8 percent had less than 1 hectare of land. The farm sizes found in this research were substantially larger than those found in Alkali's (2017) study of market participation by soybean farmers in Borno State, Nigeria.

4.15 Distribution of respondents by farming system

Table 4.2 shows that about 83.1 percent of the participant are involved in dryland farming, while 16.9 percent of the respondents practice irrigation and dryland farming system. This means that the predominant farming system practiced in the study area is dryland. Farmers rely on rainfed agriculture due to a lack of irrigation facilities. Irrigation farming system plays a vital role in overcoming drought and also increases agricultural productivity. Unfortunately most of the respondents are unable to afford irrigation equipment due to a lack of finance. The findings concur with the report that smallholder farmers in the North West Province of South Africa, are dryland farmers and do not use irrigation infrastructure (Mazibuko, 2018). Production capacities of most respondents are limited due to the lack of on-farm infrastructure (irrigation system) to tackle the prevailing drought challenge affecting the study area.

4.16 The level of market participation by respondents in the study area

Household commercialization index (HCI) was employed to determine the levels of market participation among respondents in the study area. The level of market participation is a proportion between the quantity of sunflower output sold and the total quantity of sunflower produced (Market participation = Quantity of sunflower sold/Quantity of sunflower produced multiplied by 100). As was revealed in the previous chapter, a farmer whose HCI was above 75 percent were considered market participants. While those who fall below the threshold level of 75 percent were regarded as non-market participants. Table 4.3 shows that household market

participants produced approximately 13 440 tons and the non-market participants had a total production volume of 708 tons.

Table 4.3: Statistics of Market Participation among respondents in the study area

Variables	**Market participant (90.1 percent) 155**	**Non-market participant (9.9 percent) 17**	**Total**
Gross value of sunflower produced (tons)	13440	708	14125
Gross value of sunflower sold (tons)	13138	451	13589

Source: Author's computation (2020).

The result indicates that 90.1 percent of the sampled respondents sold above 75 percent HCI, with a total sales volume of 13440 tons, thus were considered as market participants. While 9.9 percent of the sampled respondents sold below 75 percent HCI with a total sales volume of 451 tons and they were regarded as non-market participants. This indicates that respondents in the study area exhibits a high level of market participation. Thus, it can be infer that agricultural commercialization via sunflower production in Ngaka Modiri Molema District Municipality, North West Province, South Africa has prospect to increase market participation among rural households. This is unsurprising considering that the sunflower crop is a high-value cash crop with various potential in smallholder farming operations, all of which are also bolstered by the availability of a reliable market outlet such as NWK.

4.17 Econometric approach used in modeling market participation

This section presents the empirical overview used in modeling factors influencing market participation of respondents in the study area. Firstly, Pearson correlation coefficient was used to determine the link between the response variable and the regressors before estimating the probit regression model. This was done to assess the strength of the association between the dependent and independent variables, as well as whether the variables employed in the

empirical analysis have a positive or negative relationship. The Pearson correlation coefficient, which is based on the covariance approach, is a useful tool for determining the association between two variables of interest. The correlation coefficient's limit varies from +1 to -1, with +1 denoting a strong positive association, -1 signifying a strong negative connexion, and 0 denoting no connection. The correlation coefficient between market participation (a proxy for the dependent variable) and the independent variables examined are shown in Table 4.4. Finally, before fitting data for probit estimation, the variance inflation factor (VIF) was also used to check for the presence of a multicollinearity problem on all the regressors. When a variable's VIF is more than 10, multicollinearity is usually an issue. All of the regressors' VIFs, however, were less than 10 with a high tolerance threshold, as shown in Table 4.5.

Table 4.4 Correlation matrix

Variables	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}
Y	1																
X_1	**-0.002**	1															
X_2	**0.196**	0.110	1														
X_3	**-0.306**	0.149	0.109	1													
X_4	0.031	0.095	**-0.286**	**-0.156**	1												
X_5	0.048	**0.194**	**0.187**	0.064	-0.067	1											
X_6	**0.078**	**-0.197**	0.052	-0.148	-0.096	-0.004	1										
X_7	-0.144	0.085	0.135	**0.314**	-0.112	0.146	-0.076	1									
X_8	**0.179**	-0.018	0.141	0.012	-0.080	**0.227**	0.101	-0.001	1								
X_9	0.052	0.109	**0.269**	**0.213**	-083	**0.248**	0.065	**0.187**	**0.259**	1							
X_{10}	0.116	0.095	0.048	-0.060	0.103	**0.160**	-0.049	-0.042	0.069	0.013	1						
X_{11}	-129	0.107	0.049	**0.178**	-0.012	0.067	-0.117	0.034	-0.042	-095	**0.253**	1					
X_{12}	0.112	**-0.153**	0.105	-0.024	-0.087	0.143	**0.201**	**-0.165**	**0.162**	**0.231**	**-0.130**	**-0.047**	1				
X_{13}	-0.001	0.098	0.047	0.139	-0.047	**0.241**	-0.034	0.048	0.046	0.116	0.090	**0.179**	**0490**	1			
X_{14}	**0.333**	-0.081	0.089	**-0.179**	0.102	-0.131	**0.221**	**-0.212**	0.052	0.101	0.100	-0.055	**0.273**	0.041	1		
X_{15}	0.058	-0.138	-0.146	-0.066	0.124	-0.120	0.059	-0.039	0.005	0.010	**-0.177**	**-0.228**	0.148	-0.076.	0.025	1	
X_{16}	0.154	-0.084	**0.201**	-0.059	0.122	0.098	0.113	-0.098	0.100	**0.164**	**0.211**	0.090	**0.212**	0.105	**0.218**	0.059	1

Note. value in bold are different from 0 with a significance alpha <0.05

Source: Author's computation (2020)

Table 4.5. Multicollinearity test of hypothesized explanatory variables

		Collinearity Diagnostics		
Variables	**Notations**	**VIF**	**Tolerance**	**R^2**
Gender of Household	X_1	1.21	0.827	0.174
Age of household head	X_2	1.29	0.776	0.224
Household Size	X_3	1.28	0.781	0.229
Education level	X_4	1.25	0.800	0.200
Extension Access	X_5	1.31	0.766	0.234
Land Tenure system	X_6	1.16	0.865	0.135
Market Distance	X_7	1.26	0.796	0.204
Information Access	X_8	1.14	0.876	0.124
Farming Years	X_9	1.36	0.735	0.265
Cooperative Access	X_{10}	1.26	0.792	0.208
Credit Access	X_{11}	1.22	0.817	0.182
Input Access	X_{12}	1.91	0.524	0.477
Access to Grant	X_{13}	1.58	0.632	0.367
Market Outlet	X_{14}	1.30	772	0.228
Means of Transport	X_{15}	1.16	0.866	0.134
Tons Sold	X_{16}	1.12	797	0.203
Mean VIF		1.31		

Source: Author's computation (2020).

The dependent variable is represented by binary response, with 1 indicating market participant, if a respondent's sales ratio is equal to or exceeds 75% (HCI) as mentioned in the previous chapter, and zero (0) indicating otherwise. The independent variables used for the estimation are various proxies of socio-economic, farm and institutional characteristics such as age, gender, household size, education level, the land tenure system, market distance, market outlet, tons sold, cooperative membership, farming system, information, access to grant and extension services. These variables are crucial production factors that aid farmers to produce marketable surpluses (Alene *et al.,* 2008). The result obtained from the hypothesized regressors shows that age, gender, access to information, tons sold and market outlet are significant and positively

associated with the dependent variables. While household size, farming system, the land tenure system, and market distance were negatively associated with the dependent variable.

4.17.1 Factors influencing market participation of respondents in the study area

The probit regression model use for the empirical statistics to analyse factors influencing market participation of respondents is suitable as shown in Table 4.6. The goodness of fit measures indicate that the model perfectly fits the data given the likelihood ratio statistics of the high significant chi-square ($P < 0.0001$). This signifies that the model has strong explanatory power with a pseudo $\mathbf{R^2}$ of 0.5199 meaning the specification suit the model and the independent variables used for the estimation explains 51.99 percent of the variation of market participation variable. The estimated coefficient of most of the regressors influencing market participation poses the expected signs. Out of the 16 explanatory variables used in the model, the estimated coefficients for (8) regressors were statistically significant at 1 percent, 5 percent and 10 percent level. Variable such as age, gender, access to information, tons sold and market outlet are positive and statistically significant. However, variables such as farming system, household size, land tenure system and market distance were found to be statistically significant but with negative influence on market participation.

Table 4.6 shows the econometric results of the probit regression analysis. The positive coefficient signs indicates that a unit increase in the explanatory variables increases the likelihood of respondents to participate in the market. A negative coefficient signs on the other hand, implies that a unit increase in the explanatory variables reduces a farmer's likelihood of participating in the market. The marginal effects of each predictor on the outcome (market participation) was estimated along their corresponding probit regression coefficients. The marginal effects estimate for each predictor examines the expected change in respondents' probability of participating in the market as a function of a unit change in the predictor.
As shown in Table 4.6, age, gender, household size, experience, market distance, land tenure system, tons sold, and market outlet all played statistically significant roles in the likelihood of market participation among respondents in the study area.

Table 4.6 indicates that age of the household heads has a positive coefficient and is statistically significant at $p<0.01$, implying that it has a significant impact on respondents' market participation. The marginal effect indicates that respondents are 1.1 percent more likely to

increase their market participation given a unit increase in age. As a farmer grows older, he or she gains more experience, expertise, confidence, and connections, all of which reduce transaction costs and improve market efficacy. This is consistent with the findings of Nkoana et al. (2019), who found that as a farmer gets older, they develop superior market connections and confidence, allowing them to trade at a lower transaction cost and influencing their market participation. Other research has found that older farmers are more likely to engage in the market as a result of repeated practices and the accumulated experience gleaned from on-farm planning over time (Alkali, 2017).

Sigei (2018) finds that the older a household head becomes, the less likely he or she is to participate in the market. Likewise, according to Barret et al. (2008), older farmers are less open to new ideas and are more risk-averse than younger farmers, limiting their market participation capacity. Sadly, only a few young household heads were identified among respondents in the study area. The most likely explanation is the numerous obstacles that younger farmers face in gaining access to arable land, credit, and other production tools needed for high returns agricultural operations.This can also be attributable to urbanization and a lack of interest in farming, especially in rural areas, since most youths see the local agricultural operation as an unprofitable venture. More so, the cultural patterns in several rural settlements tend to favor the older farmers more in regards to securing land for agricultural purposes.

As priori expected, gender of the household head had a positive coefficient and statistically significant at ($p<0.05$). The marginal effect reports in Table 4.6 reveals that the gender of households increases the probability of market participation by 13.4 percent: suggesting that being a male-headed household likely increased the level of the market among respondents. This is not surprising, because of the high degree of male dominance among respondents in the study area. The degree of male-headed household commercialization in the study area is relatively higher than that of the female-headed households involved in sunflower productions. The result assent to the findings of Cunningham *et al.* (2008) that male-headed households are more market-oriented in terms of negotiating, bargaining and contract enforcing. Female-headed households are mostly constrained to access major factors of agricultural production than their male counterparts. The possible reason for this dispersion is that female-headed households are confined to other petty enterprises that require less labour. However, most of the female-headed households in the study area were widows, meaning they got into full time farming at the demise of their spouse to meet family economic obligations. Following

Mathenge *et al.* (2010) female-headed households in several African settings are marginalized and lack access to land for farming and other production assets.

Access to production and market information, as indicated in Table 4.6 is positive and statistically significant at ($p<0.05$). The marginal effect report suggests that having access to information increased the probability to participate in the market by 58.6 percent. Access to information is a necessity in farming operations because it enables households to make informed market and production decisions. The better access a farmer has about information on production, market outlet, input and output price, supply and demand, the lesser the tendency to incur fixed transaction cost. This shows that most of the respondents had a reasonable good access to production and market information which they accessed through various medium such as mobile phones, print media, radios, televisions, internet, market outlet, cooperatives and seed companies. Olwande and Mathenge (2012) found that ownership of communication gadgets has a positive and significant impact on sales proportion. This result also matches with the findings of Nwauwa (2012), that access to information had a positive significant influence in the level of market participation among households. Other empirical report had shown that there is a strong positive relationship between access to information and the level of market participation among farmers.

Table 4.6 indicates that the market outlet had a positive coefficient and statistically significant at ($p<0.01$). The marginal effect denotes that a unit increase in the usage of market outlets resulted in a 92.1 percent probability of respondents to participate in the market. The positive relationship between market outlet and the level of market participation among respondents stems from the readily available sunflower market being provided by NWK. As revealed in the preceding section, NWK is the main market outlet dominating the sunflower sector in the district. Meaning the NWK market outlet is the major motivation influencing farmers' interest in sunflower production in the study area. This privately own agribusiness institute assure and provide the market for sunflower among other grains irrespective of the quantities or qualities of produce, thus, influences the level of market participation among respondents, particularly in the district. Moreover, most of the respondents revealed that NWK buy their produce at the current seasonal SAFEX price. The majority of respondent further reveals that this SAFEX price system is very vital, as it guarantees price uniformity among producers. Therefore, the availability of market outlets and assurance of sales is crucial to increase households' production and market participation capabilities. Since farmers are inspired to produce and

participate more in the agricultural output and input markets when there are available markets that accept their produce regardless of the quality, quantities or time of production.

As shown in Table 4.6 quantities of sunflower sold in tons have a positive coefficient and statistically significant at ($p<0.10$). The marginal effect result shows a 0.2 percent likelihood of respondents to increase the level of market participation given an increase in the quantity of sunflower sold. This can be attributed to increased returns of capital investments on the production of sunflower crop. The finding is consistent with the report of Pender and Alemu (2007); Mussema and Dawit (2012) that quantities of crop sold positively and significantly influenced the level of market participation among smallholder farmers. Normally, farmers are inspired to increase production and quantities of produce sold when profit is maximized from a given crop which invariably increases the propensity to participate in the market. As a rule, farmers are inspired to sell a particular quantity of crop provided the market price is equal to or greater than the production cost. The quantity of produce sold increases farmers' income and consequently boost their market participation ability.

Table 4.6 shows that there is a strong negative and statistically significant ($p<0.01$) relationship between household size and the level of market participation among respondents. The marginal effect report suggests that an increase in the size of household result in a 4.3 percent decrease in the likelihood to participate in the market among respondents in the study area. The larger a household, the greater its consumption demands on farm income and resources, which negatively affect the level of market participation among farmers. This finding is consistent with Nwauwa (2012) that the more members a household has, the lesser the tendency to participate in the market. Correspondingly, Apind (2015) reported that large family size causes a decrease in farmers' abilities to participate in the output markets.

There is a negative and statistically significant ($p<0.05$) association between land tenure system and level of market participation among households. The marginal effect shows that the predominant land tenure system practice decreased respondents' probabilities to participate in the market by 32.6 percent. As shown in Table 4.6 land tenure system negatively influenced the market participantion in the study area. Despite the significant role of land in agricultural productivity, most of the respondents had access to land but under a communal land tenure system which they indicated to be a major constraint because of the absence of title deeds. The situation is further exacerbated by favouritism, where households with greater influence on tribal chiefs had more access to productive land, that in most cases led to ineffective use of

land; as land was allocated to those with no dedications and the required farming experiences. This situation distorts market factors and undermines the level of market participation and as well threatens the integration of households into national and international markets. Therefore, access to land, consolidated by other factors is generally recognized as the most essential determinant of rural household income, however, most farmers in communal land projects in South Africa are constrained due to the high number of households in a single allocated plot of land (Baloyi, 2010).

As indicated in Table 4.6 market distance negatively influence the level of market participation among respondents and it is statistically significant at ($p<0.10$). The marginal report reveals that as market distance increases by a kilometre, the likelihood to participate in the market decreased by 6.6 percent. It is a known fact that smallholder farmers are constrained by storage and logistics infrastructure. Distance as always been a disincentive to the level of market participation of smallholder as a result of poor road infrastructure and the cost of transporting produce to market outlets. Poor road infrastructure and cost of transport increases transaction cost that ultimately affects income and the level to which households participate in the market. Road infrastructure, frequencies of market visits, market distance and transportation cost determine farmers' access to inputs and output (Baloyi, 2010). The findings collaborate with Mbitsemunda and Karangwa (2017) reports, that as market distance increases, household commercialization level decreases. In the same vein, Alkali (2017) found that households in close distance to market outlets have better probabilities to increase the level of market participation due to distance proximities than households that are in far distances from market outlets. Notwithstanding, market proximity reduces transaction costs as it facilitates household access to several agricultural services and market information.

Contrarily to priori expected, variables such as level of education, farming years, access to grant, credit, inputs, cooperative and extension services were statistically insignificant on households market participation in the study area. For instance, access to the extension has an unexpected negative sign. The probable rationale that can be advance, is that most of the farmers get information and training through mediums such as market outlet (NWK), seed company (Panner, Agricon and Mosanto) and farmers organisation (GrainsSA and AFASA).

Table 4.6. Probit regression result on factors influencing the level of market participation among respondents in the study area.

MKT_PART	**Coef.**	**Std. Err.**	**Marginal effect (dy/dx)**	**z**	**p>|z|**
Household gender	1.267**	0.699	0.134	2.11	**0.035**
Age	0.104***	0.032	0.011	3.33	**0.001**
Household Size	-0.409***	0.129	-0.043	-3.18	**0.001**
Education	0.212	0.255	0.023	0.83	0.406
Extension Access	-0.321	0.562	-0.034	-0.57	0.567
Land Tenure Sys	-1.541**	0.641	-0.326	-2.40	**0.016**
Market Distance	-0.618*	0.349	-0.066	-1.82	**0.068**
Information Access	1.298**	0.592	0.586	2.20	**0.028**
Farming Years	1.163	0.394	-0.018	-0.41	0.680
Cooperative Access	1.135	0.771	0.085	1.47	0.141
Credit Access	-0.365	0.731	-0.069	0.50	0.618
Input Access	0.407	0.623	0.056	0.65	0.514
Access to Grant	1.114	0.602	0.013	0.19	0.850
Market Outlet	1.351***	0.507	0.921	2.66	**0.008**
Means of Transport	0.312	0.637	0.047	0.49	0.625
Tons Sold	0.015*	008	0.002	1.82	**0.069**
_Constant	-0.981	1.562		-2.00	0.045
Number of Obs = 172					
LR chi2 (16) = 57.68					
Prob > chi2 = 0.0000					
Pseudo R2. = 0.5199					
Log likelihood = -26.633761					

Note: *** = 1 percent significance level; **:5 percent significance level; *:10 percent significance level

Source: Author's computation (2020).

Subsequently, several postestimation test was done to ascertain the overall goodness of fit measure of the empirical probit model. The predictive margin shows a 90 percent probability for a household to participate in the market where all predictors held at mean values.

Model VCE: **OIM**

Table 4.7 Predictive margins

	Delta-method			
	Margin	**Std.Err.**	**Z**	**p>|z|**
Constant	0.903	0.017	55.12	0.000

Source: Authors computation (2020).

Table 4.8 shows model-selection statistics such as the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). The goodness of fit is balanced by these criteria that is measured using the residual sum of square (RSS) against the model complexity/flexibility (measured by the various number of regression coefficients). Under a certain assumption, AIC is an estimate of a constant as well as the relative distance of the unknown true likelihood function of a dataset and the fitted likelihood function of the model, with a lower AIC indicating that a model is closer to the truth when compared to the value of the BIC. Thus, the AIC value suggests that the model fits the hypothesized datasets. See Table 4.8 for AIC and the BIC result.

Table 4.8 Akaike's information criterion and Bayesian information criterion

Model	**Obs**	**ll(null)**	**ll(model)**	**Df**	**AIC**	**BIC**
.	172	-55.473	-26.634	17	87.267	140.775

Note: N=Obs used in calculating BIC

Source: Authors computation (2020).

For the sake of brevity, Pearson's goodness of fit measures was also used to assess how well the selected distribution model fits data as reported in Table 4.9. As a rule, higher p-values in this type of post-estimation test mean that the model adequately fits the data. In the same

manner, lower p-values signify that the predicted likelihoods in the model vary significantly from the observed likelihoods in the data. That mean the model does not fit the data, so choosing a different distribution can enhance the model's fitness. However, the Pearson p-value in this study is high at 1.0000, implying that the selected model properly fits the data since a non-significant test result (as in this scenario) is indicative of a good fitting model.

Table 4.9 Pearson goodness-of-fit test

Number of observations	=	172
Number of covariate patterns	=	172
Pearson chi2(155).	=	70.06
Prob > chi2	=	1.0000

Source: Authors computation (2020).

4.18 Chapter outline

This chapter presents a synopsis of the socio-economic characteristics of the respondent in the study area. The result reveals that the majority of the respondents are educated male-headed households with an average household size of 5.76 members. The mean age of the respondents was 52.55 years, where a majority had between 1 – 10 years of farming experience. The predominant market outlet is (NWK) and most had access to extension services but poor extension contacts. The majority of respondents operate on a communal land tenure system, with a farm size between 1 to 100 hectares. More so, respondents rely on rainfed agriculture and most of their farms are individually managed. Most of the respondents did not belong to any farmers group or union, nor did they have access to grants, credit, and subsidies. However, a majority practice mixed crop and livestock farming systems. Following this, HCI was employed to determine market participation among respondents. Then, correlation analysis was done to check the association and strength of the relationship between the outcome variable and the regressors influencing sunflower market participation of smallholder farmers in the district municipality. Before conducting the probit regression analysis, a multicollinearity test was done to check the regressors for collinearity problem and the result indicates no sign of serious multicollinearity problem among variables. The HCI result shows that a majority of the respondents were market participants. Variables such as age, gender, market distance, tons

sold, access to information and market outlet had a positive and significant influence on market participation. In contrast, household size and land tenure system were found with a negative and significant influence on the level of market participation among respondents.

CHAPTER 5. SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter presents the summary, findings, conclusions and policy recommendations based on the empirical results interpreted in the preceding chapter. The purpose of this study was to examine market participation of smallholder sunflower farmers in Ngaka Modiri Molema District Municipality, North West Province, South Africa. One hundred and seventy-two (172) sunflower producing households from the district municipality were selected using a stratified random sampling technique. Data on socio-economic, market and institutional characteristics of respondents were obtained using semi-structured questionnaire. Data were sorted, cleaned, encoded, and analysed using Statistical Package for Social Sciences (SPSS) version 26, Microsoft Excel (MS Excel) 2020 and STATA 14.0 computer software. Descriptive statistics, household commercialization index (HCI) and probit regression model were subsequently used to determine the socio-economic characteristics, level of market participation and factors with significant influence on households market participation in the study area.

5.1 The main research findings

The specific research objectives as indicated in chapter one was to; (a) Analyse the socio-economic characteristics of smallholder sunflower farmers in the study area (b) To determine the level of market participation of respondents in the study area (c) To identify and analyze the factors that influence market participation of smallholder sunflower farmers in the study area

5.1.1 Objective 1: analysis of socio-economic factors of smallholder sunflower farmers in the study area

The study finds that the majority of respondents were married male-headed households with an average age of 52.55 years. The majority of respondents are full-time farmers with access to extension service but poor extension contacts. Respondents have between 1 and 10 years of farming experience with an average household size of 5.76 members. They practice a dryland and mixed farming system (crop and livestock) without irrigation and operate under a communal land tenure system. Almost all of the respondents individually manage their farms and receives assistance from family members, but most of the time use hired labor services. It

was observed that most of the respondents were buying sunflower seeds from seed companies such as Panner, Agricon, Mosanto and a few get seeds as grants from the government. NWK is the dominant market outlet in the district, however, very few respondents use other market outlets. The majority of respondents own transport and travel an average distance of 0 – 10 km to the market outlet..

5.1.2 Objective 2: to determine the level of market participation of smallholder sunflower farmers in the study area

HCI was used to achieve this objective. As stated in Chapter 4, respondents exhibited a high level of commercialization, the result indicates that the majority (91 percent) of the respondents were market participants. This implies that even the least market participants in the observation cannot be tagged as subsistence farmers; instead, they are semi-commercial farmers. The findings suggest that the commercialization of the sunflower crop has prospects to boost market participation in the smallholding sector.

5.1.3 Objective 3: analysis of the factors that influence market participation of respondents in the study area.

A probit regression model was used to identify the factors influencing market participation among respondents. Eight (8) of the explanatory variables among other influencing factors were found to have a statistically significant influence on market participation of respondents in the study area. The variables are age (Coef = 0.103, $p<0.01$), gender (Coef = 1.267, $p<0.05$), household size (Coef = -0.409, $p<0.01$), market outlet (Coef = 1.351, $p<0.01$), access to information (Coef = 1.298, $p<0.05$), land tenure system (Coef = -1.541, $p<0.05$), quantity sold in tons (Coef = 0.015, $p<0.010$) and market distance (Coef = 0.618, $p<0.010$).

The model expressed 0.5199 (51.99 percent) in the probability variation, according to the adjusted Pseudo coefficient of determination. The marginal effects reveals variety of regressors shifts that had a major impact on respondent's market participation. The post-estimation test, in fact, validated the compatibility of the empirical probit model used in the data analysis. Regarding the research hypothesis in section 1.5 of chapter 1, the null hypothesis is rejected in favor of the alternative hypothesis: there is a statistically significant relationship between sunflower market participation and its production. The empirical probit model shows that several factors exerted positive significant effects on market participation of sunflower

producing households in Ngaka Modiri Molema District Municipality, North West Province, South Africa.

5.2 Conclusion

A few studies have been conducted to better understand market participation among smallholder farmers, but only one (Mathagu, 2016) has focused on the market participation of smallholder sunflower farmers in South Africa. Thus, this study employed a more deterministic approach to examine market participation of smallholder sunflower farmers in Ngaka Modiri Molema Districts Municipality. To address the various research questions, econometric models and descriptive statistics were adopted. The findings of the empirical econometric model close the knowledge gap on market participation of smallholder sunflower farmers in Ngaka Modiri Molema District Municipality, North West Province, South Africa.

5.3 Recommendations:

The following recommendations are proposed based on the findings of this study,

(a) According to the findings of the survey, the gender of the household played a significant role in the level of market participation among the respondents. The government and other related agencies should focus their efforts on raising awareness and breaking the male dominance in sunflower production in the study area. This can be accomplished by implementing interventions and initiatives that encourage women's participation in the sunflower industry by providing equal opportunities, resources, and awareness.

(b) There is a high level of non-youth participation in sunflower production in the study area, amidst the lucrative nature of the sunflower crop. The future of agriculture lies in the hands of the youths, however, the dearth of youths in the sunflower industry threatens the realization of a sustainable oilseed crop production in the study area. Typically, the existing system needs an overhaul or revised to introduce better sustainable opportunities that are more youth-centric. This can be achieved by making the sector more flexible and accessible for the youths. Agriculture through the sunflower industry can be used to tackle youth employability challenges, especially in the study area by focusing on proper awareness, capacity building, and partnership aimed at increasing youth participation in mainstream agriculture.

(c) The land tenure system played a significant but negative role in the level of household market participation. As indicated in the study, a majority of the respondents operate on a communal land system that does not guarantee landholding rights. Access to land and landholding right increases farmer's willingness to increase production. The government through the various departments that are tasked with land redistribution should provide an impartial medium of land distribution among the rural households. This would not only increase agricultural productivity but will also inspire new and existing farmers to increase their participation in the sunflower industry. Farmers tend to produce more when there is some kind of land security. However, while admitting that land is a pertinent factor in crop production, it should also be noted that land alone cannot increase a farmer's interest and effectiveness in agricultural operation without the presence of other complementary production assets.

(d) A holistic approach needs to be employed to facilitate careful oversight of grants and subsidies disbursement. Nepotism of any kind needs to be admonished in regards to grants disbursement because most respondents acknowledged the widespread of preferential treatments. It is not enough to roll out grants and subsidies. Effective independent institutions need to be established as well as policies that are addressed to the rural environment to ensure proper and uniform distributions of these grants.

(e) Although most of the respondents have extension services, the frequencies of extension services were very low in the study area. In every sense, extension service and technical supports are crucial to the achievements of sustainable agriculture. While there is a greater need for the government to increase its mandate and furnish extension officers with more resources. This can be accomplished through rekindling the existing Extension Recovery Plan to remedy the skills and culture gaps in provincial extension services to rural households. This will not only boost the awareness of extension and advisory services delivery within the district but will also improve the quality of communication with farmers. The role of extension support service cannot be downplayed in terms of an effective engagement with farmers of low educational attainment.

(f) There seem to exist an oligopsony structure of the sunflower markets in the study area. Oligopsony breeds monopolistic behaviors and results in no market competition. Although there is a reliable market but farmers like varieties of reliable choices, hence there is a need for market diversifications. The government and private institutions,

policymakers, and other relevant stakeholders in collaboration with the National Agriculture Marketing Council (NAMC) can work hand in hand to establish a holistic stratagem that will guarantee products (sunflower) produced by households have more diversified domestic and international markets. This will complement the other existing market outlets while also promoting proper market competition.

(g) Social capital otherwise known as farmer's groups also plays a significant role in households' market participation. Policies and efforts need to be targeted to strengthen the leadership structure of the existing farmers' organization and also promote farmers' collective actions, particularly in vulnerable rural areas. This will ensnare the proper circulation of information and farming practices. Collective actions among farmers can also make it easier for farmers to have access to production assets and also serve as a medium between farmers, sponsors, and the government to secure access to working capital. Supporting farmers through a commodity group (Social capital) fosters the implementation of targeted technical support and capacity building to groups of households, rather than to individuals.

(h) Lastly, there is a need for more flexible financial and credit access. This will ensure a greater and easy depth of credit access for farmers to purchase essential production inputs and equipment that will ultimately aid to increase farm production.

5.4 Suggestions for future research

This study mainly focused on the level and factors that influence the market participation of sunflower producing households in Ngaka Modiri Molema District Municipality, North West Province, South Africa. The study was limited to a particular district due to budgetary and logistical constraints. As such, generalizations are impossible to make because realities in different districts and provinces may vary. Therefore, the researcher proposes further study on the following topics:

a. Factors influencing market participation of smallholder sunflower farmers in the other four districts municipality in North West Province, South Africa.

b. Economic analysis of sunflower production in North West Province, South Africa.

c. Comprehensive information on different market outlets within the Province could accommodate future needs for understanding specific market outlet that influences

smallholder farmers market behaviors, thus foster public initiatives and policies which will boost household wealth creation and standard of living.

REFERENCES

Abedullah, A.M and Bukhsh, K. (2007). Issues and Economics of Poultry Production: A case study of Faisalabab, Pakistan. *Pakistan Vet. J*., 27(1): 25-28.

Adenegan K. O., Adepoju, A. and Nwauwa, L. O. (2012). Determinants of Market Participation of Maize Farmers in Rural Osun State of Nigeria. *International Journal of Agricultural Economics & Rural Development,* Vol. 5(1): 28-39.

Aker, J. (2010). Information from market near and far: mobile phones and agricultural market in Niger. America economic journal: *Applied Economics, 23.*

Alene, A. D., Manyong, V. M., Omanya, G., Mignouna, H. D., Bokanga, M. and Odhiambo, G. (2008). Smallholder market participation under transaction costs: Maize supply and fertilizer demand in Kenya, Journal *of Food Policy*, vol. 33, no. 4, pp. 318-328.

Aliber, M., Kirsten, M., Maharajh, R., Nhlapo-Hlope, J. and Oupa-Nkoane, O. (2006). Overcoming underdevelopment in South Africa's second economy. *Development Southern Africa, 23: 45-61.*

Alkali, H. M. (2017). *Analysis of market participation by women soybean farmers in Hawul Local Government area of Borno State, Nigeria.* MSc Dissertation, University of Maiduguri, Nigeria.

Altshul, H. (1998). Output to Purpose Review of DFID‟s Crop Post-harvest Programme, Value Addition to Agricultural Products. *Natural Resources International Symposium, pp. 53-61.*

Amrouk, E. M., Poole, N. D., Mudungwe, N. and Muzvondiwa, E. (2013) .*The impact of commodity development project on smallholder's market access in developing countries: Case studies of FAO/CFC projec'* Rome, United Nation Food and agriculture organization. Available at <Http://www.fao.org/docrep/017/aq290e/aq290e.pdf> (Accessed 29 March 2020).

Anim, F. D., Raphala, B. S. and Mandleni, B. (2008). Contract farming: A case study of small-scale sunflower farmers in Bojanala District of North West Province. *J. Agric.* Res., 2008, 46(2).

Antwi, M and Seahlodi, P. (2011). Marketing constraints facing emerging small-scale pig farmers in Gauteng province, South Africa. *Journal of Human Ecology*, 36 (1), 37–42. doi:10.1080/09709274.2011.11906415

Arias, P., Hallam, P., Krivonos, E. and Morrison, J. (2013). *Smallholder integration in changing food markets*. Food and Agriculture Organization of the United Nations, Rome. Available at <https://www.researchgate.net/publication/255570673> (Accessed 20 April 20 2020).

Arinloye, D.A., Pascucci, S., Linnemann, A. R., Coulibaly, O.N., Hagelaar, G. and Omta, O.S. (2015). Marketing channel selection by smallholder farmers. *Journal of food product marketing* 21:4,337 – 357.

Apind, O.B. (2015). *Determinant of smallholder farmers market participation; A case study of rice marketing in Ahero irrigation scheme.* MSc Dissertation. Egerton University.

Asfaw, A. and Admassie, A. (2004). The role of education on the adoption of chemical fertiliser under different socioeconomic environments in Ethiopia. *Agricultural Economics* 30 (3):215-228.

Baloyi, J.K. (2010). *An analysis of constraints facing smallholder farmers in agribusiness value chain: A case study of farmers in the Limpopo province*. MSc Dissertation. University of Pretoria.

Barret, B.C. (2008). Smallholder market participation: Concepts and evidence from eastern and Southern Africa. *ScienceDirect. Food Policy* 33 (2008) 299–317.

Baumann, P. (2000). *Equity and Efficiency in Contract Farming Schemes: The Experience of Agricultural tree Crops'* Working paper prepared for ODI by Social and Economic Research Associates. Overseas Development Institute 111 Westminster Bridge Road London, SE1 7JD, UK.

Berdegue, A. J. and Fuentealba, R. (2011) .*Latin America: The state of smallholders in agriculture*' Paper presented at the international fund for agricultural development (IFAD) conference on new directions for smallholder agriculture 24-25 January, 2011. Via Paolo Di Dono, 44, Rome 00142, Italy.

Berry, T. (2010). *Channel marketing moves goods from producers to consumers.* Available at: <www.mplans.com> (Accessed 8 December 2019).

Bhandari., H. and Yasunobu, K. (2009). What Is Social Capital? A Comprehensive Review of the Concept. *Asian Journal of Social Science,* Volume 37, Number 3, 2009, pp. 480-510.

Bijman., J. (2008) .*Contract farming in developing countries: an overview'* Wageningen University Department of Business Administration. Hollandseweg 1. 6706 KN Wageningen. The Netherland.

Birthal, P. S., Joshi, P. K. and Gulati, A. (2005). *Vertical coordination in high value commodities: implications for the smallholders.* MTID Discussion, Paper No. 85. Washington, DC: IFPR.

Boshoff, D. I. (2008). *The factors that influence the price of sunflower in South Africa.* MSc Dissertation. Potchefstroom Campus of the North West University.

Bureau for Food and Agricultural Policy (BFAP (2016). *The South Africa sunflower complex*. Available at <https://www.bfap.co.za> (Accessed 20 March 2020).

Chaminuka, P., Senyolo, G.M., Makhura, M. N. and Belete, A. (2008). A factor analysis of access to and use of service infrastructure amongst emerging farmers in South Africa, *Agrekon,* 47:3, 365-378.

Cloete, P. (2010). *Economic Growth and Development through Agriculture: The Case of the North West Province of South Africa.* PhD Thesis, University of the Free State, Bloemfontein.

Cunningham, L. T., Brown B. W., Anderson, K. B. and Tostao, E. (2008). Gender differences in marketing styles. *Agric. Econ*. 38(1):1-7.

David-Benz, H., Norontsoa, A., Helgina, S., Chiara, C., Noro, R. and Bezaka, R. (2016). *Improving access to market information*: A driver of change in marketing strategies for small producers. Available at

https://agritrop.cirad.fr/584174/1/DavidBenz percent20et percent20al percent20_Improving percent20access percent20to percent20market percent20information_EAAE percent2016 percent2009 percent202016.pdf> (Accessed 13 November 2019).

Delgado, C. L. (1999). Sources of growth in smallholder agriculture integration of smallholders with processors in Sub-Saharan Africa: The role of vertical and marketers of high value-added items. *Agrekon,* (38)165-189.

Department of agriculture, forestry and fisheries (DAFF, 2017). *Sunflower production guidelines.* Available at <https://www.daff.gov.za/> (Accessed 4 May 2020).

Department of agriculture, forestry and fisheries (DAFF, 2019). *Sunflower production guidelines.* Available at <https://www.daff.gov.za/> (Accessed 4 May 2020).

Department of agriculture, Forestry and Fisheries (2017). *Trend in the agricultural sector.* Available at <https://www.daff.gov.za/> (Accessed 4May 2020).

Department of agriculture, Forestry and Fishery (2018). *A profile of the South Africa sunflower market value chain.* Available at

http://www.nda.agric.za/doaDev/sideMenu/Marketing/Annualpercent20Publications/Commodity percent20Profiles/field percent20crops/Sunflower percent20Market percent20Value percent20Chain percent20Profile percent202018.pdf (Retrived 3 April 2020).

Dorward, A., Kydd, J., Poulton, C., Stockbridge, M., Chirwa, E., Cadot, J., Duncan, A., Keita, M., Meganck, M., Hassan, A. R. and Zulu, B. (2004). *Agricultural liberalization in sub-Saharan Africa*. Final report prepared for EC PREP. Available at

<https://assets.publishing.service.gov.uk/media/57a08cd4e5274a27b2001467/AgriculturalLiberalisationAfricaFinalReport.pdf> (Accessed 25 march 2020).

d'Hotel, M., Lemeilleur, S. and Bienabe, E. (2011). *Linking Smallholders to efficient markets*. Breakout session no 6. 3rd European Forum on Rural Development, Palencia, Spain.

Eaton, C. and Shepherd A.W. (2001). *Contract farming;* partnerships for growth. FAO Agricultural Services Bulletin. Rome, FAO.

Egbetokun., O. A. and Omonona., B. T. (2012). Determinants of farmers' participation in food market in Ogun State. *Global Journal of Science Frontier Research Agriculture and Veterinary Science.* 2012. 12(9):26–30.

Emmanuel, O. (2013). *The contribution of Mukwano sunflower scheme to contracted small holder farmers' household food availability. A case study of farmers in Ogur Sub County, Lira District, Uganda*. MSc Dissertation. University of Kampala Uganda.

Fafchamps, M. and Gabre-Madhin, E. (2006). Agricultural market in Benin and Malawi. *Agr.j.res* (1) 67-94.

Fafchamps, M. and Vargas-Hill, R. (2005). Selling at the farm-gate or traveling to market? *American Journal of Agricultural Economics* 87(3):717-734.

Food and Agriculture Organization ([FAO], 1997). *The state of food and agriculture small towns in Africa*. Available at <http://www.fao.org> (Accessed 20 January 2020).

Fukuyama, F. (2001). Social capital, civil society and development. Third world quarterly, vol 22, No 1, pp 7-20.

Harper, R. (2002). *The measurement of Social Capital in the United Kingdom*. Available at < http://www.oecd.org/unitedkingdom/2382339.pdf> (Accessed 2 January 2020).

Heltberg, R. and Tarp, F. (2002). Agricultural supply response and poverty in Mozambique. *Journal of Food Policy* 27 (1), 103–124.

Hlomendlini, P.H. (2015). *Key factors influencing smallholder market participation in the former homeland of South Africa: case study of the Eastern Cape*. MSc Dissertation. University of Stellenbosch.

Jahari, C., Kilama, B., Chisoro-Dube, S. and Paremoer (2018). *Growth and development of the oilseed oil value chain in Tanzania and South Africa*. Centre for competition, regulation and development. University of Johannesburg.

Jari, B. and Fraser, G. C. (2009) .An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat river valley Eastern Cape province, South Africa' Rhodes university, South Africa. *Africa journal of agricultural research* 4 (11) 1129-1137.

Jensen, R. (2007) .The digital provides information technology, market performance and welfare in the south Indian fisheries sector. *The Quarterly journal of economics (*1223) 879-924.

Karuku, J. (2014). *Smallholder farming the surest route to Africa growth*. Available at <

https://mg.co.za/article/2014-06-19-smallholder-farming-the-surest-route-to-african-growth> (Accessed 12 November 2019).

Kavoi, M. J., Mwangi, G. J. and Kamau, M. G. (2014) .Challenges faced by small land holder farmer regarding decision making in innovative agricultural development: An empirical analysis from Kenya' International *Journal of Agricultural Extension*. 02(02) 2014. 101-108.

Kirsten, J. and Sartorius, K. (2002) .Linking agribusiness and small-scale farmers in developing countries: is there a new role for contract farming. *Development Southern Africa* 17: 503-529.

Lehohla, P. (2016). *Community Survey 2016 in Brief report 03-01-06 Statistics South Africa*. Available at <http: http://www.statssa.gov.za/?page_id=6283> (Accessed 3 September 2020).

Lekunze, J. Antwi, M.A and Oladele, O.I. (2011). Socio-economic constraints to sunflower production in Bojanala farming community of the North-West province, South Africa. *Life Science Journal*. 8(2):502-506.

Louw, M. (2020). *Sunflower production field crop in South Africa.* Available at <http://southafrica.co.za/sunflower-production.html> (Accessed 28 May 2020).

Markelova, H., Meinzen-Dick, R., Hellin, J. and Dohrn, S. (2009) .Collective action for smallholder market access. *Food Policy* 34(1), 1–7.

Markowitz, C. (2018). Driving a sunflower value chain in Malawi: Challenges and opportunities. Southern Africa Institute for International affair. *Policy briefing* 179.

Martey, E., Kwame, A., Wiredu, A. N. and Attoh, C. (2012) .Does access to market information determine choice of marketing channel among smallholder yam farmers in the Brong Ahafo region of Ghana? A multinormal logit regression analysis. *Journal of economics and sustainable development* (3) 2222- 1700.

Marquez, S. and Ramos., A. (2010). *Differential policies for family farming in MERCOSUR*. Paper presented at the Roundtable on the role of smallholder agriculture and family farming in Asia and Latin America and options for South-South cooperation organized by the International Fund for Agricultural Development (IFAD) on 18 February 2010 in Rome.

Mathagu, H.T. (2016). *Market participation of smallholder sunflower farmers in Sekhukhune district of Limpopo province, South Africa*. MSc Dissertation. University of Limpopo.

Mathagu, H.T., Belete, A., Oluwatayo, I.B., and Nesamvuni, A.E (2018). Market Participation of Smallholder Sunflower Farmers in Sekhukhune District of Limpopo Province, South Africa. *Agri Res & Tech.* 15(1): 555938. DOI: 10.19080/ARTOAJ.2018.15.555938.

Mathenge, M., Frank, P., John, O. and Dagmar, M. (2010). Participation in agricultural markets among the poor and marginalized: analysis of factors influencing participation and impacts on income and Poverty in Kenya. Study Report, World Agro-Forestry Centre.

Mazibuko, V. N. (2018). *Impact of agricultural infrastructure on productivity of smallholder farmers in the north west province, South Africa*. PhD Thesis. School of Agriculture and Animal Health, University of South Africa.

Mbati, L. S. (2013). Exploring media blends for constructivist learning in open and distance learning (ODel) environment. PhD Thesis. University of South Africa.

Mbitsemunda, J. and Karangwa, A. (2017). Analysis of factors influencing market participation of smallholder beans farmers in Nyanza District of Southern Province, Rwanda. *Journal of Agricultural Science*, Vol. 9(11): 99–111.

Meyer, F., Van Der Burgh, G. and David, T. (2016). The future of sunflower production in South Africa a study by Bureau for food and agriculture policy (BFAP). *Available at* < Accessed*October 20th, 2019).*

Mgeni, C. P., Sieber, S., Amjath-Babu, T. S. and Mutabazi, K.D. (2018) .Can protectionism improve food security? Evidence from an imposed tariff on imported edible oil in Tanzania. *Food Security*. 2018, 10, 799–806.

Mitchell, R., Agle, B. and Wood, D. (1997) .Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review*, 22(4): 853-886.

Miyata, S., Minot, N. and Hu, D. (2009). *Impact of Contract Farming on Income: Linking Small Farmers, Packers, and Supermarkets in China*. Elsevier. World Development Vol. 37,

No. 11, pp. 1781–1790, 2009. Available at <www.sciencedirect.com> (Accessed 11 March 2020).

Mmbando, E. F., Wale, Z.E. and Baiyegunhi, J. S. L. (2015). Determinations of smallholder farmers participation in maize and pigeon pea market in Tanzania. *Agrekon* 54:1,96-119.

Mmbando, E. F. (2014). *Market participation, channel choice and impacts on household welfare: the case of smallholder farmers in Tanzania.* Ph.D Thesis. School of Agricultural, Earth and Environmental Sciences College of Agriculture, Engineering and Science University of KwaZulu-Natal Pietermaritzburg.

Mmbengwa, V. M., Khoza, T. M., Rambau, K. and Rakuambo, J. (2018). Assessment of the participation of smallholder farmers in agro-processing industries of Gauteng Province. *OIDA International Journal of Sustainable Development, Ontario International Development Agency, Canada*. ISSN 1923-6654 (print) ISSN 1923-6662.

Moyo, T. (2010). *Determinants of participation of smallholder farmers in the marketing of small grain and strategies for improving their participation in the Limpopo river basin of Zimbabwe.* MSc Dissertation. University of Pretoria 5-7.

Musah, A.B., Bonsu, O.A. and Seini, W. (2014) .Market participation of smallholder maize farmers in the upper west region of Ghana. *Africa Journal of Agricultural Research.* Vol 9(31), pp.2427-2435.

Mussema, M. and Dawit, A. (2012). Red pepper marketing in Siltie and Alaba in SNNPRS of Ethiopia: Factors affecting households' marketed pepper. *International Research Journal of Agricultural Science and Soil Science*, 2(6), 261-266.

Mwema, C. M., Lagat, J. K. and Mutai, B. K. (2013). *Economics of Harvesting and Marketing Selected Indigenous Fruits in Mwingi District, Kenya.* Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia.

Myers, R. L. (n.d.). *Sunflower: A Native oilseed with growing markets. Alternative crop guide. Publish by Jefferson Institute*. Available at

<https://www.extension.iastate.edu/alternativeag/cropproduction/pdf/sunflower_crop_guide.pdf> (Accessed 1 June, 2020).

National agricultural marketing council (NAMC, 2019). *supply and demand estimate report of October 2019.* Available at <https://www.namc.co.za/wp-content/uploads/2019/02/SASDE-Report-01-Feb-2019.pdf> (Accessed 4 November 2019).

Nkoana, M. A., Cholo, M. S., Hlongwane, J. J. and Belete, A. (2019). Determinants of households' willingness to pay for water and electricity in Moletjie under Aganang Municipality, Limpopo province, South Africa. *Journal of Agribusiness and Rural Development*, 1(51): 43–50.

North West Provincial government, Republic of South Africa (2020). *Agriculture* Available at <http://www.nwpg.gov.za/Agriculture.html> (Accessed 3 May 2020).

North West Province (n. d) *Hybrid Physical Map.* Available at <http://hrsport.nl> (Accessed 15 October 2019).

Nwaiwu I. U., Ohajiaya, D.O., Orebiyi, J. S., Obasi P. C., Lemchi, J.I., Ibekwe U.C., Onyeagocha, S. U. O., Ukoha, I.I., Osuji, M. N and Kadiri, F. A. (2012). Socio-Economic Determinants of The Productivity of Garden Egg (Solanum Melongena) Farmers in Imo State, Southeast Nigeria. *Int'l Journal of Agric. and Rural Dev.* 15 (2):1147 – 1152.

Nwauwa, L. O. (2012). *Determinants of Market Participation of Maize Farmers in Rural Osun State of Nigeria.* Available at <https://www.researchgate.net/publication/265466598> (Accessed 5 November 2020).

Nxumalo, K. K. S., Oduniyi, O. S., Antwi, M. A. and Tekana, S. S. (2019). Determinant of market channel choice utilized by maize and sunflower farmers in North West province, South Africa. *Cogent social sciences* (5) 1678451.

Olwande, J. and Mathenge, M. (2012). *Market Participation among the Poor Rural'* EP 2015 (62) 1 (163-179) 177 *Households in Kenya*, A paper prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil.

Ortmann, G. and King, P. R. (2007). Agricultural cooperatives II: can they facilitate access of small-scale farmers in South Africa to input and product markets. *Agrekon*, 1(46): 40-68.

Osmani, A.G. and Hossain, E. (2015). Market participation of smallholder farmers and its determinants in Bangladesh. *Review Article: Economics of Agriculture. Vol.* 62(1): 163–179.

Otekunrin, O. A., Momoh, S. And Ayinde, I. A. (2019). Smallholder Farmers' Market Participation: Concepts and Methodological Approach from Sub-Saharan Africa. *Current Agriculture Research Journal. ISSN:* 2347-4688, Vol. 7, No. (2) 2019, pg. 139-157.

Patkar, S., Asthana, S., Arya, S., Natawidjaja, R., Widyastuti, C. and Shenoy, S. (2012). *Small-scale farmers' decisions in globalized markets*: Changes in India, Indonesia and China, IIED/HIVOS/ Mainumby, London/The Hague/La Paz. Available at <http://pubs.iied.org/ > (Accessed 2 June 2020).

Pender, J., & Alemu, D. (2007). *Determinants of smallholder commercialization of food crops: Theory and evidence from Ethiopia*. IFPRI (International Food Policy Research Institute), Discussion Paper No. 75, Washington DC, USA.

Petros, T. (2010). *Adoption of conservation tillage technologies in Metema Woreda, North Godar zone, Ethiopia*. MSc Dissertation. Haramaya University.

Piennaar, L. and Traub, N.L., (2015) .*Understanding the smallholder farmers in South Africa Towards a sustainable livelihood classification.* 29th International conference of agricultural economists, Milan Italy. Available at <https://ideas.repec.org/p/ags/iaae15/212633.html> (Accessed 29 march 2020).

Pinstrup-Andersen, P. and Shimokawa, S. (2006). *Rural infrastructure and agricultural development.* Paper prepared for presentation at the Annual Bank Conference on Development Economics, 29-30 May, Tokyo, Japan. Available at http://www. siteresources.wordbank.org/> (Accessed 20 March 2020).

Polit, D. F., Beck, C. T. and Hungler, B. P. (2001). *Essential of nursing research:* Methods, appraisal and utilization. 5th ed. Philadelphia: Lippincott.

Polit, D. F. and Beck, C. T. (2004). *Nursing research: Appraising evidence for nursing practice.* 7th Edition. Philadelphia: Wolters Klower/Lippincott Williams & Wilkins.

Poole, N. (2017). *Smallholder agriculture and market participation.* Food and Agriculture Organization of the United Nation and Practical Action Publishing. 3-50.

Prowse, M. (2012). Contract farming in Developing Countries-A review. Institute of Development Policy and Management, University of Antwerp.

Rosales, M. R., Pomeroy, R., Calabio, J. I., Batong, M., Cedo, K., Escara, N., Facunla, V., Gulayan, A., Narvadez, M., Sarahadil, M., Sobrevega, A.M. (2017). Value chain analysis and small-scale fisheries management. *Elsevier*. *Marine policy* 83 (2017) 11-21.

Rustinsyah, R. (2015). *Social capital and implementation of subsidized fertilizer program for smallholder farmers: A case study in rural java, Indonesia*. Available at <https:/ doi.org/10.1177/0973005215572730> (Accessed 18 March 2020).

Saptutyningsih, E., Diswandi, D. and Jaun, W. (2019). *Does social capital matter in climate change adaptation? A lesson from agricultural sector in Yogyakarta, Indonesia.* Available at <https://reader.elsevier.com/reader/sd/pii/S0264837718313759?token=747D184BA991F7ABDA264CB1AD282E685023EC079AECA553814FB3496D647589C749122C210FDEE2B646915A8B530011> (Accessed 26 march 2020).

Sharma, V. P., Jain, D. and Sourovi, D. (2012). *Managing agricultural commercialization for inclusive growth in South Asia.* Agriculture Policy Series, Briefing Paper No. 6/2012, GDN, New Delhi, India.

Sigei, G.K. (2014). *Determinants of market participation among small-scale pineapple farmers in Kericho county, Kenya*. MSc thesis. Egerton University.

Soe, W.P., Masahiro, M. and Susumu, F. (2015). *An Analysis of the Factors Influencing Marketing Channel Choice by Paddy Rice Farmers in Myanmar*. Laboratory of Food Marketing and Distribution, Division of Agricultural and Resource Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University, Fukuoka, 812-858, Japan. *J. Fac. Agr., Kyushu Univ.,* 60 (2), 535–542 (2015).

South Africa Government News Agency (2018). *The North West Department of Rural, Environment and Agricultural Development.* Available at <www.sanews.gov.za/south-africa/r46-million-north-west-farmers> (Accessed 14 October 2019).

South Africa Grains Laboratory NPC ([SAGL] 2020). *South Africa Sunflower Crop.* Quality report 2018/2019. Available at < https://sagl.co.za/sunflower/reports/> (Accessed 17 July 2020).

Thamaga-Chitja, E. and Morojele, P. (2014). The context of smallholder farming in South Africa: Towards a livelihood asset building framework. *Hum Ecol* 45(2): 147-155.

Thapa, G. (2010). *Smallholder or Family Farming in Transforming Economies of Asia and Latin America: Challenges, and Opportunities.* Paper presented at the International Conference on Dynamics of Rural Transformation in Emerging Economies. April 14-16, 2010, New Delhi, India.

Thapa, G. (2010). *Smallholder farming in transforming economies of Asia and the Pacific: Challenges and opportunities.* Paper presented at the Roundtable on the role of smallholder agriculture and family farming in Asia and Latin America and options for South-South cooperation organized by the International Fund for Agricultural Development (IFAD) on 18 February 2010 in Rome.

Thindisa, L. M. V. and Urban, B. (2018). *Human- social capital and market access factors influencing agro-processing participation by small-scale agripreneurs: The moderating effect of transaction cost.* Acta commercii 18(1), a500. Available at <http://doi.org/ 10.4102/ac. v18i1.500> (Accessed 2 April 2020).

Torimiro, D. O., Yusuf, O.J., Subir, S. K., Amujoyegbe, B. J., Tselaesele, N. and Ayinde, J. O. (2014). Utilization of sunflower crop among smallholder farmers in sub-Saharan Africa: evidence from Nigeria and Botswana. *Journal of Agricultural Extension and Rural Development (9) 298-304.*

Tridge, (2014). *Top producing Countries of Sunflower oil. Market Intelligence*. Available at <https://www.tridge.com/intelligences/sunflower-oil/production> (Accessed 20 March 2020).

Tshiame, I. (2018). Transformation through the Grain Farmer Development Association. *OILSEEDS Focus.* Vol 4. No 2. ISSN 2410-1206. Available at https://www.opot.co.za/index.php?page=oilseeds-focus-vol-5-no-4-december-2019 (Access 20 May 2021).

Ugochukwu, C. N. (2020). Market participation variables in commercializing South African smallholder farmers. Department of Agriculture, Central University of Technology, South Africa.

United Nations Conference on Trade and Development ([UNCTAD], 2015). The role of smallholder farmers in sustainable commodities production and trade. *Trade and Development Board Sixty-second session'* Item 6 of the provisional agenda. Evolution of the international trading system and its trends from a development perspective. Geneva, 14–25 September 2015 Available at <http://www.un.org/en/zerohunger/challenge.shtml > (Accessed 20 June 2020).

van Schalkwyk, D. H., Groenewald, A. J., Fraser, G. C., Obi, A., Tilburg, V. A., Herman, D., Gudeta, Z. A., Groenewald, A. J., Jari, B., Jooste, A., Jordaan, A., Kambewa, V. E., Klopper, J., Magingxa, L., Pote, T.P., Stroebel, L. and van Tilburg, A. (2012). Unlocking Markets to Smallholder farmers. A lesson from South Africa. *Mansholt publication series - volume 10. Wageningen Academic Publishers,* pp. 23-33. ISSN: 1871-9309.

van Zyl, C. J. (2010). *Capturing the dynamics of South Africa sunflower seed market in a partial equilibrium framework*. MSc thesis. University of Pretoria.

Vellema, S. Ton, G. de Roo, N. and van Wijk, J. (2013). *Value chain, partnership, and development; using case studies to refine programme theories.* Available at <https://www.researchgate.net/publication/258136950_Value_Chains_Partnerships_and_Development_Using_Case_Studies_to_Refine_Programme_Theories> (Accessed 28 April 2020).

Vink, N. and Kirsten, J. (2005). *Agriculture in the national economy*. In L. Nieuwoudt & J. Groenewald, eds. The challenge of change: Agriculture, land and the South African economy. Pietermaritzburg: University of Natal Press. pp.3-19.

Wickramasinghe, U., Omot, N., Patiken, D.A. and Ryan, J. (2014). *Market Participation of Smallholder Agricultural Households in Papua New Guinea.* Centre for alleviation of poverty through sustainable agriculture (CAPSA). Working paper No. 108. United Nation Economic and Social Commission for Asia and the Pacific.

Wiggins, S. and Keats, S. (2013). Leaping and Learning: Linking smallholders to markets in Africa. London, Agriculture for Impact, Imperial College and Overseas Development Institute.

von Loeper , W., Josephine, M., Alan, B. and Scott, D. (2016). *Analysing challenges facing smallholder farmers and conservation agriculture in South Africa: A system dynamic approach.* South Africa Journal of Economics and Management Sciences, 19(5):47-773.

Ya-Fang, C., Mutuc, B. E., Fu-Sheng, T., Kun-Hwa, L. and Chien-Ho, L. (2018). Social Capital and Stock Market Participation via Technologies: The Role of Households. *Risk Attitude and Cognitive Ability'* Sustainability 2018, 10, 1904; doi:10.3390/su10061904. Available at <www.mdpi.com/journal/sustainability > (Accessed 14 November 2019).

Zamasiya, B., Mango, N., Nyikahadzoi and Siziba, S. (2014). Determinants of Soybean Market Participation by Smallholder Farmers in Zimbabwe. *Journal of Development and Agricultural Economics* 2014. 6(2) 49-58. Doi: 79. 10.5897/JDAE2013.0446.

Appendix A

Research Questionnaire;

Market participation of smallholder sunflower farmers in Ngaka Modiri Molema District, North West Province.

I am conducting a research on "**Market participation of smallholder Sunflower farmers**" in your districts. Sequel to the above mentioned, I would like to seek your kind assistance to some questions regarding your sunflower production and marketing.

Kindly, note that this survey is neither compulsory nor mandatory, participation is entirely on your own kind accord and all the information of your participation will be kept with utmost confidentiality. Thank you

Regards,
Ejovi Abafe

Affiliation: University of South Africa

Household Identification

Province:

Date of Interview:

Question number:

District municipality:

Local municipality:

Village:

SECTION 1.

Demographic / Socio-Economic characteristics

1. **Town**

No	**Local Municipality**	
1	Mafikeng	
2	Ratlou	
4	Tswaing	
4	Disobotla	
5	Ramotshere moiloa	

2. **Gender**

Male	1
Female	2

3. **Actual Age**

	Years

4. **Age Category**

18-30	1
31-40	2
41-50	3
51-60	4
60 >	5

5. **Marital Status**

Single	1	Married	2	Divorce	3	Widowed	4	Separated	5	Others	6

6. **Education Level**

No Formal Education	1
Primary School	2
High School	3
Tertiary	4
Others, specify	5

7. **Are you a member of any farmers Association (Group)?**

Yes	1
No	2

8. If yes, name them

9. Do you have access to formal cooperative?

Yes	1
No	2

10. What are the sources of your labour

Self	1
Family	2
Hired	3

11. Do you have access to extension agents?

Yes	1
No	2

12. If yes, How often

Very Often	
Occasionally	
Rarely	
Never	

13. Where is your extension agent from?

Government	1
Non-Governmental	2
Others specify	3

14. Do you engage in non-farming activities?

Yes	1
No	2

15. If yes please specify

16. What is your occupation

Employed	
Unemployed	
Retired	
Full time farmer	
Part time farmer	
Business	
Others specify	

17. Years of farming?

Number of years	

18. Size of household?

Number of Persons	

19. How many household members assist in farming?

Number of persons	

SECTION 2. Farm characteristics

1. Land tenure system

Renting	1
Communal	2
Private	3
Permission to occupy	4
Allocated through land reform	5
Other please specify	6

2. Farm owner

Farmers group	1
Family member	2
Cooperative	3
Individual	4
Private company	5
Trust	6
Others please specify	7

3. How was the land acquired, if owned?

Own finance	1
Inheritance	2
Restitution	3
PLAAS	4
Bond	5
Others, please specify	6

4. Who manages the farm?

Cooperative	1
Farmers group	2
Individual	3
Family members	4
Private company	5
Trust	6
If others please specify	7

5. Land status

Poor/need improvement	1	Satisfactory quality	2	Good	3	Have no idea	4

6. Seed source?

Previous harvest	1	Local seed shop	2	cooperative	3	Government	4	Others, please specify	5

7. What type of farming system do you practice?

Dry land	1	Irrigation system	2

8. If irrigation system, please indicate source of water?

Own built dam	1	Community dam	2	River	3	Borehole	4	Specify if others	6

9. What type of irrigation system do you practice?

Pivot	1	Sprinkler	2	Dripper lines	3	Arrow drip	4	Others, specify	5

10. Do you have any irrigation assistance?

Government	1	Individual	2	NGOs	3	Specify if others	4

11. What is your farm size?

Less than 1 hectare	1
1-100 hectare	2
100-200 hectare	3
200-300 hectare	4
Above 300	5

12. Do you have access to agricultural inputs?

Yes	1
No	2

13. If yes, what is the source of your agricultural inputs

Government	1
NGOs	2
Individual	3
Others specify	4

14. What kind of agricultural input do you have access to?

15. Do you receive agricultural subsidy/grants?

Yes	1
No	2

16. If yes, what subsidies do you receive

17. How many Km is from your farm to the market?

0 - 30km	1
31 - 60km	2
61 - 90km	3
Above 90km	4

18. Do you have access to credit?

Yes	1
No	2

19. If yes, from which source

Government	1
NGOs	2
Private	3
Others please specify	4

20. Do you have plans of getting additional land? If yes how many hectare

1 – 50 hectares	1
50 - 100 hectares	2
Above 100 hectares	3

21. Quantities produce in tons?

1 - 20 tons	1
21 - 50 tons	2
51 - 100 tons	3
Above 100 tons	4

22. Quantity sold in tons?

Tons	

23. Quantities kept for domestic uses?

Tons	

24. How long have you been farming sunflower?

1 – 10 years	1
10 – 20 years	2
20 – 30 years	3
Above 30 years	4

25. What other crop do you plant?

Wheat	1
Maize	2
Banana	3
Soybeans	4
Others, specify	5

26. What are the choices for marketing outlets

Local market	1
Supermarket	2
Farm gate to wholesale	3
NWK	4
National Market	5
Specify, if others	6

27. Reason for the market choice outlet?

28. What are the requirements when selling to wholesale, supermarket, national or export market?

Certain variety	
Minimum supply	
Frequent supply	
Specify if others	

29. Do you have access to farms information? If yes please specify

Yes	
No	

30. Source of farm information

Individual. 1	4. Government
Farmers groups. 2	5. NGOs
Cooperative. 3	6.Specify, if others

31. How do you supply your produce?

Personal vehicle	1
Hired vehicle	2

Thank you for your time, patience and participation