SMALLHOLDER GOAT FARMERS' PERCEPTIONS AND WILLINGNESS TO PARTICIPATE IN THE AGRO-PROCESSING INDUSTRY: A CASE STUDY OF MAMAILA VILLAGE, GREATER LETABA LOCAL MUNICIPALITY, LIMPOPO PROVINCE

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DECLARATION 1

I, Tshepiso Florence Matlala, hereby declare that:

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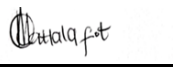
Signed: 

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As the candidate's supervisors, we agree to the submission of this thesis.

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DECLARATION 2

Tshepiso F Matlala, Mmaphuti A Nkoana, Lesetja J Ledwaba. Determinants of smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila village, Greater Letaba Local Municipality, Limpopo Province: A Journal of Agribusiness and Rural Development has been identified for paper publication from this mini-dissertation.

DEDICATION

This thesis is dedicated to my mother, Matlala Violet, and the loving memory of my brother, Maropeng Samuel Matlala.

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ABSTRACT

Smallholder farmers play a crucial role in contributing to economic development and economic growth. Nevertheless, smallholder farmers are not fully linked and introduced to the agro-processing industry which is classified as one of the main dominant sectors with potential to eradicate poverty in South Africa. For this reason, this study was determined to assess smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry. The study was conducted in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The survey data was collected from 95 sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. Descriptive statistics were used to address the first objective, data collected through Likert scale was analysed using descriptive statistics to address the second objective, and Binary Logistic regression model was used to address the third objective. Binary logistic regression model results revealed that age, gender, educational level, household size, herd size, access to credit, market information and farming experience have a statistically significant effect on smallholder goat farmers' willingness to participate in the agro-processing industry at 1% (Age, Herd size, and farming experience), 5% (Household size, Access to credit, and market information), and 10% (Gender and Household income) level of significance. The Cox and Snell R square is 0.784, which implies that 78% of the variation in smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry is explained by the explanatory variables that were significant and included in the model and 22% is not explained. To empower smallholder goat farmers, the study suggests targeted youth programmes, gender-focused financial support and mentorship, income support schemes, agro-processing training, and better credit access and market information systems. These measures aim to bridge generational gaps, promote gender equality, alleviate income limitations, and enhance market competitiveness.

TABLE OF CONTENTS

DECLARATION 1 i
DECLARATION 2 ii
DEDICATION iii
ACKNOWLEDGEMENTS iv
ABSTRACT v
LIST OF FIGURES ix
LIST OF TABLES x
LIST OF ACRONYMS xi
CHAPTER ONE 1
INTRODUCTION 1
1.1. Background 1
1.2. Problem statement 4
1.3. Rationale 5
1.4. Scope of the study 6
1.4.1. Aim of the study 6
1.4.2. The objectives of the study were to: 6
1.4.3. Research hypotheses 6
1.5. Organisation of the mini dissertation 6
1.6. Summary 7
CHAPTER TWO 8
LITERATURE REVIEW 8
2.1. Introduction 8
2.2. Key basic concepts in the study 8
2.2.1. Smallholder farmers. 8
2.2.2. Perception 9
2.2.3. Willingness to participate 9
2.2.4. Agro-processing 10
2.3. An overview of goat production globally, in Africa, South Africa and Limpopo Province. 10
2.4. The importance of goat farming in Southern Africa 12
2.5. Smallholder goat farmers' perceptions on agro-processing value addition markets . 13
2.6. Background of the South African agro-processing industry. 15
2.7. Smallholder farmers' participation in the agro-processing industry. 16

2.8. Constraints faced by smallholder farmers in the agro-processing industry. 16
2.9. Socio-economic factors influencing smallholder farmers' participation in the agro-processing industry. 17
2.10. Conceptual framework: smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry 24
2.11. Summary 25
CHAPTER THREE 26
RESEARCH METHODOLOGY 26
3.1. Introduction 26
3.2. Description of the study area 26
3.3. Data collection methods and sampling procedure. 28
3.4. Data analysis and general models. 28
3.4.1. Binary logistic regression model 29
3.5. Validation of the results 30
3.6. Ethical considerations. 31
3.7. Summary. 31
CHAPTER FOUR 32
RESULTS AND DISCUSSIONS 32
4.1. Introduction 32
4.2. Descriptive statistics of the socio-economic characteristics (continuous variables) .. 32
4.3. Descriptive statistics of categorical data 33
Figure 4.1: Gender of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province (n=95) 34
Figure 4.2: Marital status of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province (n=95) 35
Figure 4.3: Employment status of smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province (n=95). 36
Figure 4.4: Sampled smallholder goat farmers' credit accessibility (n=95) 36
Figure 4.5: Sampled smallholder goat farmers' access to market information (n=95). . 37
Figure 4.6: Household income of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province (n=95) 38
4.9. Sampled smallholder goat farmers' perceptions towards the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 41
CHAPTER FIVE 44
EMPIRICAL RESULTS AND DISCUSSIONS 44
5.1. Introduction 44
5.2. Binary Logistic regression model results 46

5.3. Discussion of significant variables 47
5.3.1. Age of sampled smallholder goat farmers in Mamaila village, Greater Letaba Local Municipality, Limpopo Province 47
5.3.2. Gender of sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. 48
5.3.3. Household size of sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 49
5.3.4. Household income of smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province. 49
5.3.5. Herd size of smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province..... 50
5.3.6. Access to credit by smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province 50
5.3.7. Market information received by smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province. 51
5.3.8. Farming experience of smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province. 51
5.4 Summary..... 52
CHAPTER SIX 53
SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS 53
6.1. Introduction 53
6.2. Conclusion 53
6.3. Summary..... 54
6.4. Policy Implications and Recommendations..... 55
6.5. Recommendations for further research..... 57
REFERENCES..... 58
APPENDIX A: CONSENT LETTER and FORM 65
Name of Subject/Participant..... 68
Signature of Subject/Participant Date:..... 68
Signature of Investigator : Date:..... 68
APPENDIX B: QUESTIONNAIRE 68

LIST OF FIGURES

Figure 1.1: Provincial distribution of live goats in 2021 11

Figure 2.1: Diagrammatic representation of the conceptual framework 22

Figure 4.1: Gender distribution of smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 32

Figure 4.2: Marital status of smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province 33

Figure 4.3 Employment status of smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province 34

Figure 4.4: Access to credit by smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province 35

Figure 4.5: Market information received by smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province 36

Figure 4.6: Household income of smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province 37

Figure 4.7: Smallholder goat farmers' sources of income in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 38

Figure 4.8: Smallholder goat farmers' willingness to participate in the agro processing industry in Mamaila Village, Greater Letaba Local Municipality. Limpopo Province 39

Figure 4.9: Smallholder goat farmers' perception towards the agro processing' potential to increase income in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 40

Figure 4.10: Smallholder goat farmers' perception towards potential of agro-processed products to increase farm productivity and create more marketing opportunities 41

Figure 4.11: Smallholder goat farmers' perception towards market competition created by commercial farmers in the agro processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 42

LIST OF TABLES

Table 2.1: Various goat breeds in Southern Africa 12

Table 2.2: Reasons for keeping goats in South Africa 14

Table 3.1 Description of dependent variables and independent variables 27

Table 4.1: Continuous variables description of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province(n=95) 31

Table 5.1: Diagnostics to assess the degree of multicollinearity of sampled smallholder goat farmers in Mamaila village, Greater Letaba Local Municipality, Limpopo Province (n=95) 43

Table 5.2: Binary logistic regression model results of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province 45

LIST OF ACRONYMS

DAFF	Department of Agriculture, Forestry and Fisheries
StatsSA	Statistics South Africa
GDP	Gross Domestic Product
BFAP	Bureau for Food and Agricultural Policy
DTIC	Department of Trade, Industry and Competition
RPO	Red Meat Producers' Organisation
FAO	Food and Agriculture Organisation
IFAD	International Fund for Agricultural Development
DARD	Department of Agriculture and Rural Development
FAO	Food and Agriculture Organisation
GPS	Global Positioning System
GVA	Gross Value Addition
IFAD	International Fund for Agricultural Development
IPAP	Industrial Policy Action Plan
NGP	New Growth Path
NDP	New Development Plan
RMDSA	Red Meat Development South Africa
SPSS	Statistical Package for Social Science

CHAPTER ONE

INTRODUCTION

1.1. Background

The South African agricultural sector is dualistic. As a result, it is distinguished by a small number of prosperous commercial farmers and many disadvantaged smallholder farmers (Department of Agriculture, Forestry and Fisheries (DAFF), 2012). According to Statistics South Africa (StatsSA (2023), the agricultural sector experienced a notable 4.2% increase in performance, contributing 0.1 % to the Gross Domestic Product (GDP). This highlights the significant role the agricultural sector played in driving South Africa's economic performance in the second quarter of 2023 as compared to nine other leading sectors (StatsSA, 2023). Moreover, the animal products sub-sector provided the largest contribution to agricultural revenue at 56%, followed by the horticulture sub-sector, with a contribution of 35%, and field crops contributing only 9% (StatsSA, 2023). According to the Bureau for Food and Agricultural Policy (BFAP (2023), in the animal products sub-sector, the industries that saw the biggest contractions were sheep (11%), wool (9%) and beef (3%). Similarly, the pork and poultry industries were the primary drivers of revenue growth in the animal products sub-sector due to the increase in prices of these products in the second quarter of the year (BFAP, 2023).

The potential of the goat industry and its contribution to South Africa's GDP is not highlighted in recent reports, which implies that the industry is underestimated and less efforts have been made to ensure that it adds value to the economy. For this purpose, the agro-processing industry, as one of the lucrative industries in the agricultural sector, has been identified as an industry where the potential of goats in South Africa can be leveraged. According to Fan *et al*., (2013), the agro-processing industry is highly dominated by commercial farmers as compared to smallholder farmers. In comparison to commercial farmers, smallholder farmers have the potential to alleviate economic challenges and contribute to sustainable livelihoods in most rural communities (Fan *et al*., 2013; Thindisa, 2014). Above all, the Department of Trade, Industry, and Competition (DTIC), 2022) attested that agriculture and the agro-processing industry have the potential to make transformations in the economy by creating jobs and integrating smallholder farmers in the agro-processing, which has the potential to

significantly alleviate poverty in rural areas (Fan *et al*., 2013).Consequently, goat farming has been identified as one of the significant role players in adding value to rural livelihoods by ensuring that there is an enhanced level of food security in rural areas (Mataveia e*t al*., 2021).

Similarly, goats are classified as high-yielding breeds kept for milk and meat production on smallholder subsistence and part-time farms with the potential to generate income and increase food security levels in most of the rural communities of the African regions (Palmer *et al*., 2022). Therefore, evidence from the Red Meat Producers' organisation (RPO) report highlighted that the emerging sector (smallholder farmers, small-scale farmers and emerging farmers) contributes to 73% of the households that own goats in South Africa (RPO, 2017). Furthermore, the Limpopo Province is classified as one of the largest producers of goats in the country, including both indigenous and commercial breeds (Mogala, 2012). A study conducted by Tyasi, Ng'Ambi, and Mogashoa (2022) revealed that the South African goat population has risen to 6 million. However, the DAFF in 2018 indicated that approximately 1% of goats are being slaughtered by commercial farmers and marketed through commercial abattoirs. Therefore, the potential of goat meat in the red meat industry is observed, and it is expected to be a major contributor to animal-derived protein for human consumption soon (Mazhangara *et al*., 2019).

Studies have shown that the nutritional benefits of goat meat are superior to other red meats (Ivanović *et al*., 2016; Van der Weele *et al*., 2019). Therefore, due to these nutritional benefits coupled with the ability to adapt and survive in harsh climatic conditions, goats are currently regarded as the second most valued livestock after cattle in rural areas (Mazhangara *et al*., 2019; Ogundeji, 2022). Thus, goat meat's nutritional benefits pose the greatest advantage and a growing potential in the marketing of products made from goat meat (Mazhangara *et al*., 2019). According to Muchenie (2017) and Mogala (2018), goats are highly classified as livestock breeds with low input requirements as opposed to cattle. For this purpose, smallholder goat farmers in rural areas will use this as an advantage to maximise profits and generate more income from the low input production of goat farming. Moreover, the ability of goats to survive in harsh climatic conditions creates a more profitable platform for smallholder goat farmers to participate in agro-processing and improve rural livelihoods as compared to cattle (Mataveia *et al*., 2021; Sejian *et al*., 2021).

According to the Food and Agriculture Organisation (FAO) 2013), goats contribute about 6% of greenhouse gas emissions, and a significant potential arising from this point of view is that goats are part of the solution to sustainable and green food sources with great potential to contribute to sustainable development in the economy. In fact, goats are highly considered as sustainable and nutritious protein sources (Palmer *et al*., 2022). For this reason, recent global consumption trends show that there is an increase in the consumption of goat products, more especially goat meat; however, consumption in South Africa is unpopular (Mazhangara *et al*., 2019). Additionally, recent studies (Palmer *et al*., 2022; Mazhangara *et al.,* 2022; Ibrahim *et al*., 2020) have been conducted about consumers' willingness to purchase byproducts of goat meat, and the results revealed that most of the participants are willing to purchase and consume byproducts of goat meat regularly, rather than just at special occasions. Despite an increasing rate of the consumption of byproducts of goat meat in other countries and consumer's willingness to purchase byproducts of goat meat in South Africa, there is a gap in knowledge about smallholder goat farmers' willingness to participate in the agro-processing industry in South Africa. Hence, this study sought to identify smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry.

A study conducted by Palmer *et al.,* (2022) indicates that consumers' willingness to purchase byproducts of goat meat such as biltong, burger patties, sausage, meat balls and polony, highlights the greatest potential for an increase in goat meat consumption. Therefore, the development of goat meat value-added products will play a significant role in improving rural livelihoods and generating more income for smallholder goat farmers (Palmer *et al*., 2022). Furthermore, Palmer *et al*., (2022) indicated that there is a significant emerging potential of introducing goat meat processed products in retail outlets in South Africa. Nevertheless, smallholder goat farmers' perceptions about participating in agro-processing are unknown. Evidence from studies by Mazhangara *et al*., (2022) and Palmer *et al*., (2022) infer that goat meat has the potential to fill in the markets; however, in comparison to other red meats, less efforts have been made to improve goat meat's productivity and integrating smallholder goat farmers into value addition markets.

Additionally, Mohlatlole *et al*., (2015) attested that the consumption of byproducts of goat meat in South Africa and its availability in retail is very low compared to other countries. Identifying the smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry is key and the results obtained in this study will fill in a gap in knowledge about the integration of smallholder goat farmers in the agro-processing industry.

For this purpose, this study sought to assess smallholder goat farmers' perceptions and their willingness to participate in the agro-processing industry.

1.2. Problem statement

Goat farming significantly contributes to red meat production and has been recognised as a significant driver for the development of the economy and agrarian livelihoods in South Africa (Palmer *et al*., 2022; Phophiwa *et al*., 2020; Chetroiu *et al*., 2013; Food and Agriculture Organisation (FAO), 2013; Webb and Casey, 2010). Thus, smallholder goat meat farmers' inclusiveness in the agro-processing industry possesses substantial potential to alleviate economic hardships and contribute to sustainable livelihoods in impoverished areas (Khoza *et al*., 2019; Thindisa, 2014; Fan *et al*., 2013; Wilkinson and Rocha, 2008). According to Mazhangara *et al*., (2022) and Palmer *et al*., (2022), goat meat has the potential to fill the markets; however, in comparison to other red meats, less efforts and investments have been made in improving goat meat productivity and integrating smallholder goat farmers into value addition markets.

Furthermore, the great potential of goat meat to enhance local economies is underrated, and its production level in formal marketplaces is extremely limited (Soji and Muchenie, 2017). This implies that byproducts of goat meat are not widely made available to consumers, hence goat meat consumption in South Africa remains low (Palmer *et al*., 2022; Mazhangara *et al*., 2022; Ibrahim *et al*., 2020; Soji and Muchenie, 2017). There has been an observed decline in the number of goats slaughtered in South Africa every year (DALRRD,2021). Although there is a substantial developing potential for introducing byproducts of goat meat in South African retail outlets, smallholder goat farmers' perceptions of participation in the agro-processing industry are unknown (Palmer *et al*., 2022). Recent studies (Palmer *et al*., 2022; Mazhangara *et al*., 2022; Ibrahim *et al*., 2020) have been conducted about consumers' willingness to purchase byproducts of goat meat, however there is a knowledge gap with regards to smallholder goat farmers' willingness to participate in the agro-processing industry in South Africa, particularly, in the study area.

1.3. Rationale

Goats play a substantial role in the rural areas of Limpopo Province (Soodan *et al*., 2020). Although smallholder farmers in Limpopo Province exhibit remarkably low productivity, they play a crucial role in generating sustainable livelihoods and alleviating poverty, as highlighted by Kalauba *et al.,* (2021). According to Statistics South Africa (Stats SA),2021), the Greater Letaba Local Municipality is one of the largest producers of goats in Limpopo Province, with 1164 smallholder goat farmers operating full time on farms. This implies that most of the people in the Greater Letaba Local Municipality rely on agriculture as a source of income. Therefore, the emerging potential of byproducts of goat meat in the formal markets may increase income and level of productivity for smallholder goat farmers which will result in poverty reduction and employment creation in most of the communities in the Greater Letaba Local Municipality, including Mamaila Village. Recent studies (Palmer *et al*., 2022; Mazhangara *et al.,* 2022; Ibrahim *et al*., 2020) show that health-conscious consumers are most likely to increase the demand for byproducts of goat meat. Nevertheless, there is a lack of comprehensive understanding regarding the supply of the byproducts of goat meat within South Africa. As suggested by Palmer *et al*., (2022), addressing this issue necessitates adopting a comprehensive approach that encompasses educational initiatives for consumers, enhancing market accessibility for goat meat, and developing goat meat-derived products.

As a result, understanding smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry will add to the body of knowledge that may serve as the foundation of this integrated approach which will enable smallholder goat farmers to participate in the agro-processing industry to ensure the availability of the byproducts of goat meat in the markets. The extent to which smallholder goat farmers perceive the agro-processing industry and their willingness to participate in the agro-processing industry depends on their socio-economic, institutional and environmental factors, which indicate that decision patterns can be specific depending on locality. As a result, the purpose of this study is to assess smallholder goat farmers' perceptions and analyse the socio-economic factors influencing their willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Municipality, Limpopo Province.

1.4. Scope of the study

1.4.1. Aim of the study

The aim of the study was to generate knowledge on smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.

1.4.2. The objectives of the study were to:

i. Profile the socio-economic characteristics of smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province
ii. Assess the level of perceptions of smallholder goat farmers towards the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province
iii. Analyze the socio-economic factors influencing smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.

1.4.3. Research hypotheses

i. There is no difference in the level of perceptions among smallholder goat farmers towards the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.
ii. The socio-economic factors do not significantly influence smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.

1.5. Organisation of the mini dissertation

The mini dissertation is divided into six chapters. Chapter One covers the background of the study, problem statement, rationale, and scope of the study. The remaining part of this mini dissertation is as follows: Chapter Two which follows next, presents a review of the body of existing literature related to the study subject. Chapter Three provides a presentation of the

methodology, which is made up of the area where the study was conducted, the sampling and data collection procedures and concludes with the analytical techniques used and tables of hypothesised variables. Descriptive results of the socio-economic factors are outlined and explained in Chapter Four, and the result from the empirical analysis is detailed in the discussion under Chapter Five. Finally, the last chapter (Chapter Six) draws conclusions with policy recommendations in line with the findings of the study.

1.6. Summary

This first chapter of the study covered background of the study, key concepts in the study, introduced the research problem, the rationale as well as the main concepts from which the study gained its foundation. The chapter further outlines the aim, specific objectives and, finally the hypotheses of the study. The literature and framework supporting this study are presented in the second chapter that follows.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter provides an in-depth review of the local and international literature body that exists on the study subject. The chapter starts by outlining the key basic concepts in the study, followed by an overview of goat production globally, an overview of goat production in Africa, and an overview of goat production in South Africa and in Limpopo Province. The importance of goat farming in Southern Africa, smallholder goat farmers' perception towards the agro-processing industry, background of the South African agro-processing industry, smallholder farmers' participation in the agro-processing industry, challenges faced by smallholder farmers in the agro-processing industry, a detailed review on the socio-economic factors influencing smallholder farmers' willingness to participate in the agro-processing industry, and a detailed review of the government policies and objectives aimed at improving access to high-value markets and the agro-processing industry are outlined. The chapter ends by outlining a detailed diagrammatic representation of the conceptual framework illustrating the interrelationships between the socio-economic factors influencing smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry.

2.2. Key basic concepts in the study

2.2.1. Smallholder farmers.

Smallholder farmers are defined in a variety of ways. The definitions vary according to the situation, country, and ecological zone. According to the DAFF (2012), smallholder farmers are defined as farmers owning small-based plots of land used for subsistence purposes. Similarly, smallholder farmers are farm households with access to means of livelihoods on land relying primarily on family labour for farm production to produce for self-subsistence and market sale (Ellis, 1988). Additionally, smallholder farmers are defined as farmers with limited resource endowments (Dixon *et al.*, 2003). According to the World Bank Rural Development strategy, smallholder farmers are those with a low asset base, operating less than 2 hectares

of land and depending on household members for labour (World Bank, 2003). Moreover, smallholder farmers dominate the agricultural sector in terms of the number of households that engage in livestock production with over 80% of the households owning one type of livestock in Africa (Chapoto and Subakanya, 2019). In this study, smallholder farmers refer to individuals or households who own and manage small plots of land, typically engaging in livestock farming primarily for subsistence, local markets, or supplementary income.

2.2.2. Perception

Perception is the process of human thinking about certain phenomena (Walgito, 2003; Koentjaningrat, 2010). The two studies further highlighted that many factors, such as feelings, needs, motivation, educational backgrounds and experiences are involved in the concept of perception. Perception towards a certain phenomenon can either be positive or negative. According to Robbins (2002), positive perception comes from the individual's satisfaction with a certain phenomenon, the individual knowledge, and the individual experience of what is perceived. Otherwise, negative perception comes from individual dissatisfaction about certain phenomena, and lack of experience of the object perceived. In this study, the focus is on smallholder goat farmers' perceptions towards the agro-processing industry. To enumerate perception in the context of this study, the focus is on smallholder goat farmers' level of satisfaction about the agro-processing industry, as well as their level of knowledge and experience in the agro-processing industry. To illustrate, smallholder goat farmers' negative perception towards the agro-processing industry implies that smallholder farmers have zero to no experience in agro-processing or farmers are not satisfied with the services offered by the agro-processing industry. On the other hand, smallholder goat farmers' positive perception towards the agro-processing industry implies that smallholder farmers have enough information and experience in the agro-processing industry or farmers are satisfied with the services offered by the agro-processing industry.

2.2.3. Willingness to participate

In a study conducted by Ommani *et al*., (2006), the state of being completely prepared to partake in the agricultural sector by engaging in diverse agricultural activities is characterised as willingness to participate in agricultural activities. In this study, it is smallholder goat

farmers' willingness to partake in the agro-processing industry to add value to their goat products.

2.2.4. Agro-processing

According to the Food and Agriculture Organisation (FAO) (1997), agro-processing is a branch of the manufacturing industry that processes raw materials and intermediate products originating from primary agriculture. Furthermore, agro-processing is concerned with activities that transform agricultural products into several stages to improve handling and increase the shelf-life (Mhazo *et al*., 2012). Agro-processing is defined as the processing, preservation, and preparation of agricultural production for intermediate and final consumption (International Fund for Agricultural Development, (IFAD) 2008).

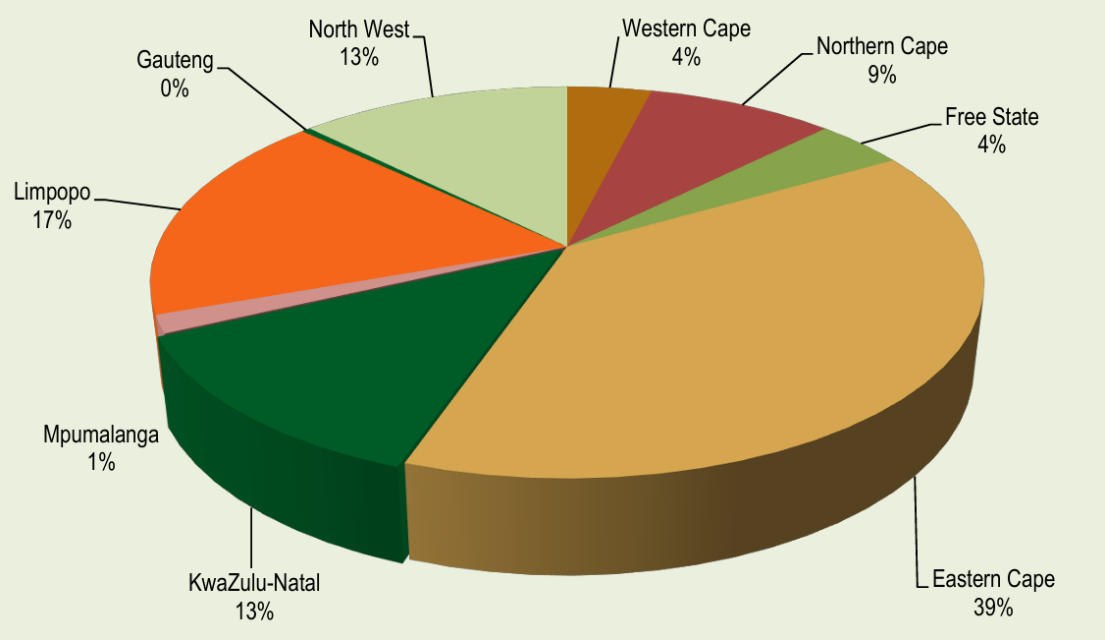
2.3. An overview of goat production globally, in Africa, South Africa and Limpopo Province.

In this study, smallholder goat production refers to the entire process of rearing goats within small-scale farming systems, encompassing all aspects of goat husbandry, from breeding and feeding to marketing and utilisation of goat products. The global goat population has seen a sharp increase over the past decade, and according to Food and Agriculture Organisation Statistics (FAOSTAT, 2023), there are over one billion goats in the world and over 90% are found in developing countries (Utaaker *et al*., 2021). Continentally, Asia had the highest number of goats, accounting for 51% of total goat stocks, while Africa had the second highest goat stock accounting for 43%, and South America accounted for 2% of total global goat stock. Other continents accounted for the last 4% of goats produced globally (FAOSTAT, 2023). In Africa, Nigeria is the largest producer of goats, followed by Ethiopia and Chad each accounting for 16%, 10% and 9%, respectively.

The SADC region accounted for 1% and 2% of the global and African production respectively. South Africa is the leading goat producer in Southern Africa, and it accounted for 56% of total goats in the SADC region, followed by Namibia (20%) and Botswana (13%). However, in terms of global goat production, South Africa is a relatively small producing country with about

3% of Africa's goats and fewer than 1% of the world's goats (Louw, 2023). In South Africa, there are 250 stud breeders. Currently in South Africa the three most crucial commercial breeds for goat meat production are Boer goat, savanna and Kalahari red. Angora goats are used to produce mohair, and they are shaved two times annually (South African Online, 2023). Above all, the largest goat-producing provinces in South Africa are the Eastern Cape, Limpopo and KwaZulu-Natal, accounting for 69% of total live goats in the country (DALRRD, 2021).

Figure 1.1: Provincial distribution of live goats in 2021.



Source: Statistics and Economic Analysis, DALRRD (2021)

As shown in Figure 1, the Eastern Cape contributes 39% of live goats in South Africa, followed by Limpopo Province (17%) and KwaZulu Natal (13%). The Limpopo Province is one of the largest producers of goats, and it has a high quality and quantity of meat. The DALRRD report further indicated that the primary reason for keeping goats in South Africa is for meat. However, the country has been experiencing a decline in the number of goats slaughtered in South Africa every year (DALRRD, 2021). On the other hand, there is observed goat population growth in the other parts of Africa, which is creating new and expanding market opportunities for smallholder farmers. For this reason, it is important to understand smallholder goat farmers' perceptions and their willingness to participate in the agro-processing industry.

2.4. The importance of goat farming in Southern Africa

The overall population of goats in Southern Africa exceeds 38 million and the largest portion of the population is kept by small-scale traditional production systems in communal areas (Mataveia *et al*., 2021). As a result, goat farming plays an important role in adding value to rural livelihoods in Southern Africa by ensuring that there is an enhanced level of food security (Mataveia *et al*., 2021). To enumerate, the population of goats in most of the African regions, including South Africa, which resulted in an increased demand for goat meat, which is now considered a significant role player in contributing to improved food security in terms of its preserved protein, as their meat is of high nutritional value and has superior lean characteristics as opposed to other red meats (Del Valle *et al*., 2019). Consequently, goats in Southern Africa are perceived as the second most important livestock after cattle, and they symbolise wealth and highly valued investments (Gwaze *et al*., 2009; Mataveia *et al*., 2021). Moreover, the importance of goat meat has been highlighted for resource poor areas in Asia and Africa, after most of the countries on these continents have been classified as top producers of goat meat (Aziz, 2010). Various goat breeds were found to be dominant in these countries and these variations are summarised in the table below.

Table 2.1: Various goat breeds in Southern Africa

Country	Breed	Population (in million)
Angola	Angola dwarf	4.7
Botswana	Tswana	1.4
Malawi	Malawi goats	8.9
Mozambique	Pafuri, Tete, Cabo Delgado and Landim	3.7
Namibia	Capriviti, Ovambo	1.9
South Africa	Boer*, Kalahari Red*, Savanna*, Nguni, Tswana, Venda, xhosa, Swazi Zulu and Tankwa	5.2
Eswatini	Nguni and Swazi	2.4
Tanzania	Maasai, Gogo, Small East African, Sukuma, Sonjo, Pare, Kunene and Kavango	18.9
Zambia	Tswanaand Matebele	2.9
Zimbabwe	Matabele, Binga, Chipinge, Matopo, Tswane, Shurugwi and Tsholotsho	4.7

Source: Mataveia *et al*.,2021

Table 2.1 above represents the top 10 countries in Southern Africa with the highest population of goats and various breeds produced in these countries, with South Africa dominated by the Boer, Kalahari Red and Savanna, which are commercial meat-type goat breeds produced in Southern Africa. The prevalence of commercial meat-type goat breeds like Boer, Kalahari Red, and Savanna in South Africa underscores the country's potential for a thriving agro-processing industry focused on goat meat products. With a market-oriented towards high-quality meat, processors can strategically target both domestic and international demand, leveraging the diverse range of goat breeds for product diversification. Moreover, there's an opportunity to develop value-added products and explore export markets, capitalising on South Africa's reputation for producing top-quality goat breeds. Hence, the purpose of this study is to analyse smallholder goat farmers' perceptions and willingness to participate in the agro-processing value-addition markets where the demand and the prices of goat meat are expected to rise soon.

2.5. Smallholder goat farmers' perceptions on agro-processing value addition markets

Smallholder farmers in most African regions produce a higher percentage of goats than commercial farmers (Chapoto and Zulu-Mbata, 2015). In fact, the population of goats has doubled over the past few years in Africa, and the number of smallholder farmers owning goats has increased by 100% (Kapembwaa *et al*., 2022). Nevertheless, this increase has not translated into a significant increase in the percentage of smallholder farmers who are participating in the agro-processing markers in Africa. Similarly, there is a reduction in the number of goats that are sold by smallholder farmers who are already participating in the value addition markets. Additionally, most smallholder farmers in the African regions are dominating the informal markets. In a study conducted by Kapembwa *et al*., (2022), in Zambia, 99% of the smallholder farmers sold their goats in informal markets and the marketing channel that was dominating was where the smallholder farmers sold their goats (live/slaughtered) to the consumers directly from their farm in the communities. The study further highlighted that smallholder farmers in most African countries use goats for social events such as weddings and traditional ceremonies, payment of dowry, funerals and settlement of disputes. For this reason, the general perception among smallholder farmers in

most African countries is that goats are mainly used for traditional and cultural purposes and, to some, as an object of wealth.

Table 2.2: Reasons for keeping goats in South Africa

Community	Reasons for keeping goats	Percentage (%)
Jericho (n=33)	Meat	30
	Security	27
	Commercial/sale	15
	Tradition	15
	Companionship	9
	Milk	3
Bolahlakgomo (n=39)	Meat	38
	Tradition	38
	Companionship	10
	Security	8
	Commercial/sale	5
Schoonoord (n=52)	Tradition	29
	Manure	25
	Security	15
	Milk	10
	Meat	10
	Companionship	8
	Other	4

Source: Webb (2020).

Table 2.2 above attests that the general perception among smallholder farmers in most African countries is that goats are mainly used for traditional and cultural purposes and to some as an object of wealth. The study conducted by Webb (2020) indicated that 38% and 29% of the smallholder farmers in Bolahlakgomo and Schoonoord communities in South Africa respectively are keeping goats for traditional purposes. Additionally, only a small percentage of the smallholder farmers in the two communities keep goats for commercial purposes, which implies that few smallholder farmers participate in the agro-processing

value-addition markets for commercial purposes. Hence, the study sought to fill in a gap in knowledge on the perceptions of smallholder goat farmers towards the agro-processing industry.

2.6. Background of the South African agro-processing industry.

Agro-processing is commonly known to contribute significantly to the alleviation of socio-economic challenges, improvement of income, employment, food availability and nutrition, and social and cultural wellbeing, which enhances the sustainability of smallholder farmers' livelihoods (Mhazo *et al*., 2012). In a nutshell, the agro-processing industry plays a considerable role in the socio-economic development. Hence, it is among the best sectors, as identified by the Industrial Policy Action Plan (IPAP), the New Growth Path and the National Development Plan (NDP). The involvement of smallholder farmers in agro-processing has the potential to contribute significantly to sustainable livelihoods (Thindisa, 2014; Wilkinson and Rocha, 2008). In fact, smallholder farmers' participation in the global value chains is perceived as of prime importance for their inclusion in the agricultural development in developing countries. However, smallholder farmers are confined to economic participation within the informal sector with a focus on primary agriculture, whereas commercial farmers are located within the formal economy with footprints along the agriculture and agro-processing value chain (Fan, Brzeska, and Halsema, 2013).

In South Africa, government initiatives such as the Agricultural Policy Action Plan and targeted budget allocations aim to enhance value addition within the agricultural sector. For instance, approximately R1.2 billion was allocated to support smallholder farmers specifically for initiatives related to value addition in 2021. However, studies indicate that despite these efforts, participation in agro-processing remains limited due to barriers like lack of access to finance, technology, and skills, which hinder the integration of small-scale farmers into the value chain (Mazenda and Masiya, 2022). Furthermore, research by Nyawo and Olorunfemi (2023) identifies the lack of equitable access to high-value markets as a significant barrier for smallholder farmers. Their findings advocate for policy measures that provide targeted financial assistance and capacity-building programmes to elevate smallholder participation in the agro-processing industry. Regional frameworks, such as the Comprehensive African Agricultural Development Programme (CAADP), emphasise the importance of public-private

partnerships and the role of effective governance in creating an enabling environment for agribusiness. The African Development Bank has highlighted that a vibrant private sector is crucial for agricultural transformation, necessitating government support for infrastructure development, market access, and innovation in financial services (African Development Bank, 2021)

2.7. Smallholder farmers' participation in the agro-processing industry.

The concept of agro-processing participation is difficult to define in the context of South African Agriculture because there is limited evidence to support its existence (Mmbengwa *et al*., 2018). According to Min *et al*., (2018), it is unclear if smallholder farmers desire to participate in the established value chain and agro-processing industry. In fact, smallholder farmers in most of the developing countries face numerous challenges in accessing formal profitable markets (Okoye *et al*., 2016). In a study conducted by Khoza *et al*., (2019), the results revealed that participation in the agro-processing industry by smallholder farmers is minimal and that out of their selected group of respondents, only 19% of the respondents in the study participated in the agro-processing. As attested by Thindisa (2018), smallholder farmers' participation in the agro-processing industry has a high potential to enhance the competitive advantage of smallholder agricultural initiatives. Additionally, smallholder farmers' dominance in the agro-processing sector has the potential to boost yield by providing incentives, information, and capital for input purchases (Brain and Barret, 2014). Moreover, increasing participation of smallholder farmers in the agro-processing industry has the potential to enhance income levels through increased productivity (Moono, 2015). According to Mahmoud *et al*., (2018), the benefits that smallholder farmers could gain by participating in the sector are identified as improved cashflows, viable farming entities and job creation.

2.8. Constraints faced by smallholder farmers in the agro-processing industry.

Smallholder farmers face constraints in making decisions about their participation in the agro-processing industry in African countries (Feenstra, 2018). The study further alluded that attributes to such constraints are high competition with commercial farmers in the agro-

processing industry, lack of access to financial support for smallholder farmers, lack of market information and no access to productive land (Feenstra, 2018). In a Nigerian study conducted by Oladejo *et al.*, (2011), the observed constraints were lack of capital, lack of government support, poor weather conditions, diseases, and a combination of the listed constraints. Additionally, another study was conducted in Punjab state- India, by Meena *et al*., (2014), to outline constraints faced by rural smallholder farmers in agro-processing. The study revealed that socio-economic, technological, and farming constraints were more prominent than extension and marketing constraints. The study has a similar orientation to Khapayi and Celliers (2016) on factors limiting and preventing emerging farmers from progressing to commercial agricultural farming in the Eastern Cape Province, South Africa. The two studies highlight the government's important role in encouraging smallholder farmers' market participation by encouraging group marketing.

2.9. Socio-economic factors influencing smallholder farmers' participation in the agro-processing industry.

Recent studies have highlighted socio-demographic, economic and institutional factors such as gender, age, educational level, size of the household, level of income, farm size, type of farming enterprise, experience in farming, number of labourers, land tenure, access to training, access to information, and distance to market as the main determinants of choice to participate in the agro-processing industry by smallholder farmers (Palmer *et al*., 2022; Mmbengwa *et al*., 2018; Thindisa., 2014). In this study, the socio-economic factors influencing smallholder goat farmers' willingness to participate in the agro-processing industry are as follows:

Age

Smallholder goat farmers' willingness to participate in the agro-processing industry can be influenced by age. In general, farming is quite often thought to be a job that should be done by people of old age (Sharma, 2007). Thus, the relationship between the age of a smallholder farmer and the decision to participate in the agro-processing industry is non-linear, which implies that with the increasing age of the smallholder farmer, up to a certain age, he or she

is more likely to increase the level of participation in the agro-processing industry (Khoza *et al*., 2018). Similarly, other studies have shown that age affects agro-processing market participation positively in that older smallholder farmers have more farming experience and marketing acquired over time; therefore, these smallholder farmers are more likely to participate in agro-processing markets (Abdullah *et al*., 2018; Randela *et al*., 2008). On the contrary, the findings of a study conducted by Alam *et al*., (2009) indicated that age has a negative relationship with smallholder farmers' willingness to participate in the agro-processing industry. Similarly, other studies found that younger smallholder farmers participate more in the agro-processing markets as opposed to older smallholder farmers (Adepoju *et al*., 2015; Mdlalose, 2016; Okoye *et al*., 2016). For this reason, young smallholder farmers are highly classified as individuals who are innovative and more enthusiastic to participate in agro-processing activities (Abdullah *et al*., 2018; Geoffrey *et al*., 2013). Above all, Kumornu *et al*., (2014), did not find any relationship between age and participation, which implies that smallholder goat farmers' willingness to participate in the agro-processing industry was not influenced by age but by the gender of a smallholder farmer.

Gender

The agriculture industry is highly dominated by women due to an increase in the number of women participating in agricultural activities (Deere, 2005; FAO, 2011; DAFF, 2017; Mkhize, 2019). According to Katz (2003), rural women's participation in farm and non-farm activities has increased over the years. Similarly, the agro-processing is highly dominated by female smallholder farmers as opposed to male smallholder farmers. This evidence is supported by Kuwornu *et al*., (2014), Simtowe (2010) and Oluwatayo (2009) who found that male smallholder farmers are less likely to participate in agro-processing activities than their female counterparts. Consequently, Marchetta (2011) also revealed women are believed to be doing agro-processing activities more than men. Moreover, the study of Dumayiri *et al*., (2014) further indicated that the agro-processing industry is dominated by more women than men among smallholder farmers. These results are in line with Khoza *et al*., (2019), who revealed that men play a dominant role by participating in agro-processing activities. On the contrary, the findings of a study conducted by Senyolo *et al*., (2018), on the socio-economic factors influencing smallholder farmers' decision to participate in agro-processing industry in

Gauteng Province highlight that male smallholder farmers have a dominant participation in the agro-processing industry.

Marital status

Recent studies have highlighted that marital status is an insignificant factor and does not influence smallholder farmers' participation/ decision to participate/ willingness to participate in the agro-processing industry and other value-addition markets (Palmer *et al*,. 2022; Mmbengwa *et al*., 2018; Abdullah *et al*., 2018; Thindisa., 2014; Geoffrey *et al*., 2013). Palmer et al., (2022) found that factors such as access to credit, market information, and agricultural experience had a more pronounced impact on participation than marital status. Similarly, Mmbengwa *et al*., (2018) reported that demographic factors, including marital status, had minimal correlation with farmers' engagement in agro-processing, emphasising that economic and resource-related factors were more decisive. Abdullah et al. (2018) echoed these findings, suggesting that while family structure may play a role in decision-making, it does not independently drive participation in agro-processing initiatives. Thindisa (2014) and Geoffrey *et al*., (2013) also noted that smallholder farmers are often more influenced by practical considerations such as access to training, resources, and market opportunities than by marital status. These insights collectively suggest that policymakers should focus on enhancing economic resources and support systems rather than demographic characteristics when seeking to encourage smallholder participation in agro-processing.

Educational level

Educational level is associated with an increased willingness to participate in the formal sector, particularly the agro-processing industry (Anyonga, 2005). According to Maponya *et al*., (2016), educational level has a positive influence on smallholder farmers' willingness to participate in the commercial markets. It empowers smallholder farmers in making an informed decision, identifying market opportunities, and gaining marketing skill and knowledge that encourage market participation. Consequently, the study of Alwang *et al*., (2005) indicated that better educated smallholder farmers are more likely to diversify into agro-processing. In addition, Sisay (2010) provides empirical evidence from a study conducted in one of the rural areas of Ethiopia where smallholder farmers' participation in value-addition markets was influenced by household size and level of education. Moreover, there was a positive association between farming experience, education, and market

participation (Maponya *et al*., 2016). Additionally, Geoffrey *et al*., (2013), attested that educational level of smallholder farmers positively influences market participation. Smallholder farmers' willingness to participate in the sector is determined by education attainment, age of a smallholder farmer and marital status (Dietz *et al*.,2000). On the other hand, Khoza *et al*., (2019), indicated that most smallholder farmers that are old with no formal education are less likely to participate in the agro-processing industry.

Employment status

South Africa's unemployment rate is currently 32.9% (Stats SA, 2024). For this reason, many smallholder farmers depend on participating in formal and informal agricultural activities as the main source of income (Nhliziyo and Mushunje, 2024). Nhliziyo and Mushunje(2024), added that employment status is a significant factor with a negative correlation with participation in formal markets, which implies that unemployed smallholder farmers are more likely to participate in formal markets as opposed to employed smallholder farmers. A study conducted in Uganda highlighted that employment status does not influence smallholder farmers' decision and willingness to participate in value addition markets (Adong *et al*.,2020).

Household size

In most African countries, particularly in rural areas, household size plays a vital role in terms of farm labour which influences the number of smallholder farmers willing to participate in formal markets (Kilbridge, 2018). In a study conducted by Mashaphu *et al*., 2021, household size was one of the variables that were found to be insignificant with a negative relationship towards participation by smallholder farmers in auction markets. On the contrary, Agrawal and Gupta (2005) found that household size has a strong positive relationship with levels of participation in agro-processing. In a study by Siko and Ismail (2020), household size was found to positively influence market participation among smallholder farmers in Kenya, suggesting that larger households can provide more labour and resources for agricultural activities, thus enhancing their market engagement. Mabhaudhi *et al*., (2021) reported that while household size is considered a factor, it did not significantly correlate with the extent of participation in formal markets among smallholder farmers in South Africa. Similarly, Okorley and Anku (2018) concluded that household size had a negligible effect on the decision-making processes related to market participation among smallholders in Ghana.

Household income

Smallholder farmers' level of income influences their willingness to participate in the agro-processing industry. Evidence from the study of Nhliziyo and Mushunje (2024) revealed that household income is a significant factor, and it negatively affected smallholder farmers' participation in formal markets. Furthermore, Kuwornu *et al*., (2014, indicated that household income influences the level at which smallholder farmers diversify into the agro-processing value-addition markets. In contrast, Abdullah *et al*., (2018) found that off-farm income results in a reduced market participation level. The outcome was supported by Senyolo *et al*., (2018), who reported that off-farm income has a negative influence on smallholder farmers' willingness to participate in the agro-processing industry, which implies that an increase in the level of off-farm income received by smallholder farmers decreases farmers' level of participation into the agro-processing value addition markets.

Herd size

In a study conducted by Mashuphu *et al*., (2021) on factors affecting smallholder farmers' participation in formal auction markets, herd size was found to be a significant factor exerting a positive effect on the level of participation by smallholder farmers in formal auction markets. The findings of the study were in line with the study of Fidzani (1993), who revealed that large herds generate a higher marketable surplus than small herds, the expectation is that the larger the herd, the higher the level of participation of small-scale farmers in the mainstream markets.

Access to credit

Access to credit is a crucial factor influencing smallholder farmers' decisions and willingness to participate in the agro-processing industry. Thindisa *et al.,* (2018) highlight that improved access to financial resources empowers farmers, enabling them to invest in necessary tools and technologies that enhance productivity and competitiveness in the market. In a similar vein, research by Nyangena *et al.,* (2019) demonstrates that credit access significantly impacts the agricultural sector's growth by facilitating investment in agro-processing, thus allowing farmers to transition from subsistence to commercial farming. Furthermore, a study by Manda *et al*., (2021) emphasises that access to credit not only improves farmers' capacity to purchase inputs but also enhances their overall market participation and income

generation, contributing to rural economic development. Additionally, research by Ochieng *et al*., (2022) shows that smallholder farmers with access to credit are more likely to adopt agro-processing practices, thereby increasing their willingness to engage with high-value markets.

Market information

Access to market information significantly influences smallholder farmers' participation in the agro-processing industry. The study of Coetzee *et al*., (2004) revealed that the provision of market information strengthens farmers 'negotiating ability during transactions with buyers. Consequently, it prevents possible exploitation by better-informed buyers, which increases the number of smallholder farmers willing to participate in the formal value-addition markets. On the other hand, Asmah (2011) found that there is no significant relationship between access to information and participation in value addition markets by smallholder farmers.

Distance to market

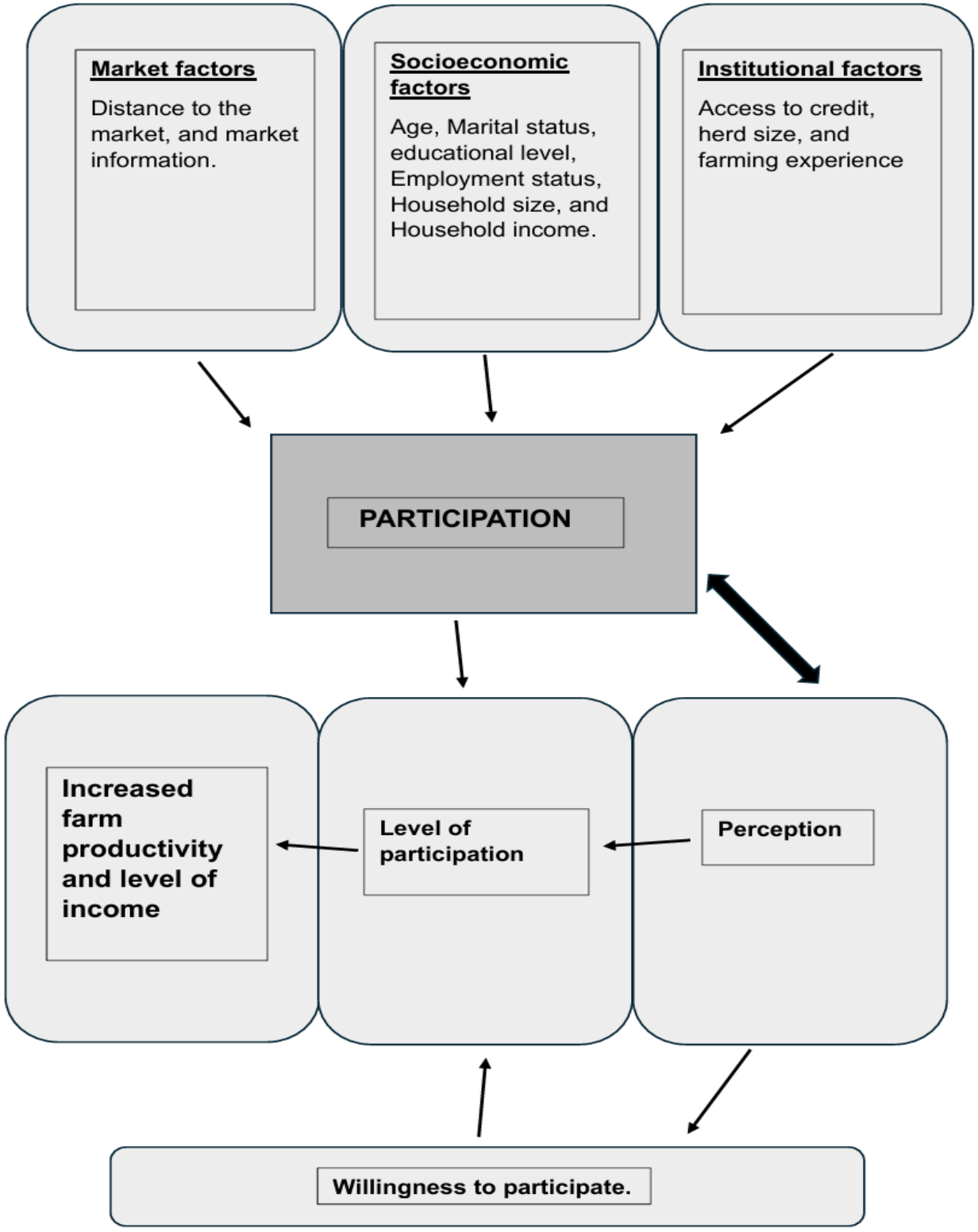
The relationship between distance to market and diversification among smallholder farmers presents a complex picture, as evidenced by varying studies. Wanyama *et al*., (2010) provided strong evidence that increased distance to markets positively affects diversification. This suggests that farmers may seek to diversify their production to mitigate risks associated with market access, as they face challenges related to transportation costs and access to a variety of markets. Conversely, Eneyew (2012) reported a negative relationship between distance to market and diversification, indicating that greater distances may hinder farmers' ability to diversify their crops effectively. Moreover, the work of Omiti *et al*., (2009) and Senyolo *et al*., (2018) emphasises the negative influence of distance from farm to market on smallholder farmers' willingness to participate in the agro-processing industry. They argue that considerable distances can act as a major constraint, limiting farmers' access to markets, increasing transaction costs, and ultimately reducing their engagement in agro-processing activities. This aligns with findings by other researchers, such as Makhura (2001), who noted that distance often exacerbates the difficulties faced by smallholder farmers in accessing both input and output markets.

Farming experience

Farming experience is a significant factor influencing smallholder farmers' livelihoods and their willingness to engage in formal agricultural markets, as noted by Khatun and Roy (2012). Their study emphasises that with increased experience, farmers develop better skills and

knowledge, which enhances their capacity to diversify their agricultural activities and market participation. Supporting this view, Okoye *et al*., (2009) found that farming experience positively impacts smallholder farmers' involvement in the agro-processing industry. Experienced farmers tend to have a deeper understanding of market dynamics, enabling them to make informed decisions about diversification and value addition. Similarly, Tarawali *et al*., (2012) corroborated this by demonstrating that farmers with more years of experience are often more confident in their abilities to manage risks and uncertainties associated with market fluctuations.

2.10. Conceptual framework: smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry



Source: Author's compilation (2024)

Figure 2.1: Diagrammatic representation of the conceptual framework.

The conceptual framework in Figure 2.1 illustrates the interrelationship in the study, the key variables involved and how they are interrelated. The conceptual framework highlights factors such as socioeconomic factors (Age, Marital status, educational level, Employment status, Household size, and Household income), institutional factors (Access to credit, herd size, and farming experience), and market factors (Distance to the market, and market information) influencing smallholder goat farmers' participation in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. Simultaneously, smallholder goat farmers' perception towards the agro-processing industry influences their participation, willingness to participate in the agro-processing industry as well as the level of participation. Smallholder goat farmers' willingness to participate in the agro-processing industry increases the level of participation which results in an increase in farm productivity and the income generated by smallholder goat farmers.

2.11. Summary

The literature reviewed revealed that with an increase in goat population globally and increasing prices of goat meat, smallholder goat farmers' participation in the agro-processing industry will significantly contribute to economic growth by improving the farm productivity of the smallholder goat farmers in rural areas, and by increasing their levels of income. The price of goat meat in other countries has been steadily on the rise for the last decade. Although most African countries, specifically South Africa rear goats for cultural and traditional purposes, the demand for goat meat is expected to rise soon. For this reason, the literature review of this study revealed the importance of understanding smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry for the purpose of adding value to the goat products produced such as meat and milk.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter provides a detailed review of the research methods used to collect, assemble, and evaluate data. It defines tools that are used to gather relevant information in a specific research study. Surveys, questionnaires, and interviews are common tools of research (Linda, 2020). Furthermore, the chapter provides information on study area and data collection tools and provide details on the analytical techniques that were employed to address the objectives of the study.

3.2. Description of the study area

The study was conducted in Mamaila Village in the Greater Letaba Local Municipality of Mopani District in Limpopo Province, South Africa (GPS coordinates: 23.3632 S, 30.2809 E). The Greater Letaba Local Municipality has been identified as the smallest in Mopani District Municipality compared to the other four local municipalities in the district. According to Stats SA (2011), Mamaila Village has a total population size of 9632. The area had a total of 2517 households in 2011, wherein 63,1% were female-headed households and 36.9 % were male-headed households. The population is demarcated into Black Africans with a population percentage of 99.8, whites being the second with a population percentage of 0.2. The Greater Letaba Local Municipality is one of the largest producers of goats in Limpopo Province with 1164 smallholder goat farmers (Stats SA, 2021). According to DALRRD (2021), Limpopo Province has a total of fifty-eight Abattoirs, and fourty-five of them specialise in red meat. Furthermore, twenty abattoirs are in Louis Trichardt and Tzaneen, which is near the study area Mamaila Village in the Greater Letaba Local Municipality. DALRRD (2021) added that

181 smallholder farmers in the Greater Letaba are participating in agro-processing activities.

Figure 3.1: Municipalities (2023)

Figure 3.2: Study area (Ga-Mamaila) (2023)

3.3. Data collection methods and sampling procedure.

The study used a simple random sampling method to select 95 smallholder goat farmers from the sample frame of 125(N) smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The sample size was obtained using the Slovin sampling technique. Face-to-face interviews with smallholder goat farmers using semi-structured questionnaires were used to gather primary cross-sectional data for assessing the level of willingness exhibited by these farmers to engage in the industry. Mamaila Village smallholder goat farmers' list was sourced from the database of LDARD (2022).

The formula that was used for determining the sample size using the Slovin method is as follows:

n = N / (1 + Ne^2). n is the sample size, N is population size, and e represents the margin of error 0.05.

3.4. Data analysis and general models.

The study used descriptive statistics (measures such as the mean, median and standard deviation) to address the first objective, which was to profile the socio-economic characteristics of smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The Likert scale developed by Rens Likert (1932) to measure the degree to which respondents agree or disagree with a specific statement was used to address the second objective of this study. The second objective was to assess the level of perceptions of smallholder goat farmers towards the agro-processing. According to Gujarati and Porter (2009), the Binary Logistic Regression model is a statistical modelling technique that is widely used to estimate the probability of the occurrence of one of the two possible outcomes estimated from the values of independent variables. Binary logistic regression model was used to analyse socio-economic factors influencing smallholder goat farmers' willingness to participate in the agro-processing in Mamaila Village, Greater Letaba municipality, Limpopo Province. The general model of Marginal effects (Greene, 2002) was computed and used to interpret Binary Logistic Regression model results. Both Statistical Package of Social Sciences (SPSS) version 28.00 and STATA 18 were used to analyse data collected using semi-structured questionnaires following the face-to-face interviews.

3.4.1. Binary logistic regression model

Table 3.1 Description of dependent variable and independent variables

Variables	Description	Unit of measurement	Expected sign
Dependent variable			
Y_i- willingness to participate (WTP)	Pi= The probability that a smallholder goat farmer is willing to participate in agro-processing and 1-Pi= The probability that a smallholder goat farmer is not willing to participate in the agro-processing sector	Dichotomous	
Independent variables			
X_1- AGE	Age of a smallholder goat farmer	Years	+/-
X_2- Gender (GEN)	1 if a smallholder goat farmer is male, 0 otherwise	Dummy	+/-
X_3- Marital status (MRS)	1 if a smallholder goat farmer is married, 0 otherwise	Dummy	+/-
X_4- education (ED)	Number of years the smallholder goat farmer attended school (Years)	Continuous	+
X_5- Employment status (ES)	1 if a smallholder goat farmer is employed, 0 otherwise	Dummy	+/-
X_6- household size (HHLS)	Total number of individuals in the household living together for the past 6 months	Number	+/-
X_7-household income (HHI)	Total household income (previous 12 months)	Rands	+/-
X_8- herd size (HS)	Total number of goats in a farm	Number	+
X_9- access to credit (CRED)	1 if a smallholder farmer is accessing credit, 0 otherwise	Dummy	+/-
X_{10}-market information (MI)	1 if a smallholder goat farmer is accessing market information, 0 otherwise	Dummy	+/-
X_{11}- market distance (DIST)	Distance to agro-processing markets	Km	-
X_{12}- farming experience (FEX)	Number of years in farming	Continuous	+

The general model of Binary Logistic Regression:

$Y_i = \ln(pi/1-pi)$

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_i X_i + U_i$

Therefore: $\ln(pi/1-pi) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_{12} X_{12} + U_i$ …….. (1)

Model specification:

Binary Logistic regression model was used to examine the relationship between sampled smallholder goat farmers' WTP and socio-economic factors influencing their willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Municipality, Limpopo Province.

$WTP = \beta_0 + \beta_1 AGE + \beta_2 GEN + \beta_3 MRS + \beta_4 ED + \beta_5 ES + B_6 HHLS + \beta_7 HHI + \beta_8 HS + \beta_9 CRED + \beta_{10} MI + \beta_{11} DIST + \beta_{12} FEX + U$ ……. (2)

The general model of marginal effects to be computed to interpret the results of Binary Logistic Regression model is given as:

$\frac{\partial P_J}{\partial X_K} = P_J\left(\beta_{JK} - \sum_{J=1}^{J} P_K \beta_{JK}\right)$…….. (3)

In accordance with Greene (2002), the general model of marginal effects was employed to gauge the expected probability change associated with a particular choice when an independent variable deviates by one unit from its mean value. Thus, in this study, marginal effects were accounted for to determine how much alterations in the explanatory variables influence smallholder goat farmers' willingness to participate in the agro-processing industry.

3.5. Validation of the results

To validate the results, this study examined both the issues of heteroscedasticity together with multicollinearity. The Variance Inflation factor, also known as VIF, was utilised in the study to check for multicollinearity issues. The Variance inflation factor is a measure that helps to assess the extent of multicollinearity in a regression analysis. A VIF value of less than 10 shows that there is no multicollinearity, and a VIF value of greater than 10 shows that there is some degree of multicollinearity. Furthermore, to verify that the homoscedasticity assumption of the binary logistic regression model is not violated, Breusch-Pagan/Cook-Weisberg test will be used to examine the presence of heteroscedasticity.

3.6. Ethical considerations.

The study was conducted in accordance with the University of Limpopo's ethical standards. TREC (University of Limpopo Turfloop Research Ethics Committee) issued an ethical clearance letter for the researcher to carry out the study and the following was taken into consideration.

a) Informed consent/ Voluntary participation: Smallholder goat farmers in Mamaila Village were not forced to participate in the study.
b) Right to privacy: The information provided by the smallholder goat farmers was highly respected and kept confidential.
c) Respect for diversity: The researcher respects all cultures and beliefs. All participants were treated equally, regardless of their culture, gender, sexuality and race.

3.7. Summary.

This chapter provided a detailed description of the study area, methods of sampling used in identifying smallholder goat farmers (participants), and an outline of the methods and instruments used to acquire data from the identified respondents. The chapter further provided the methods used in data processing and analysis, while also highlighting the empirical techniques adopted and applied to this study.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1. Introduction

This chapter provides a detailed presentation of the descriptive analysis results. The data used for this analysis was collected from 95 sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo province. The analysed results in this section are presented through tables and figures, and the focus is on percentages and frequencies, mean, minimum, maximum and standard deviation.

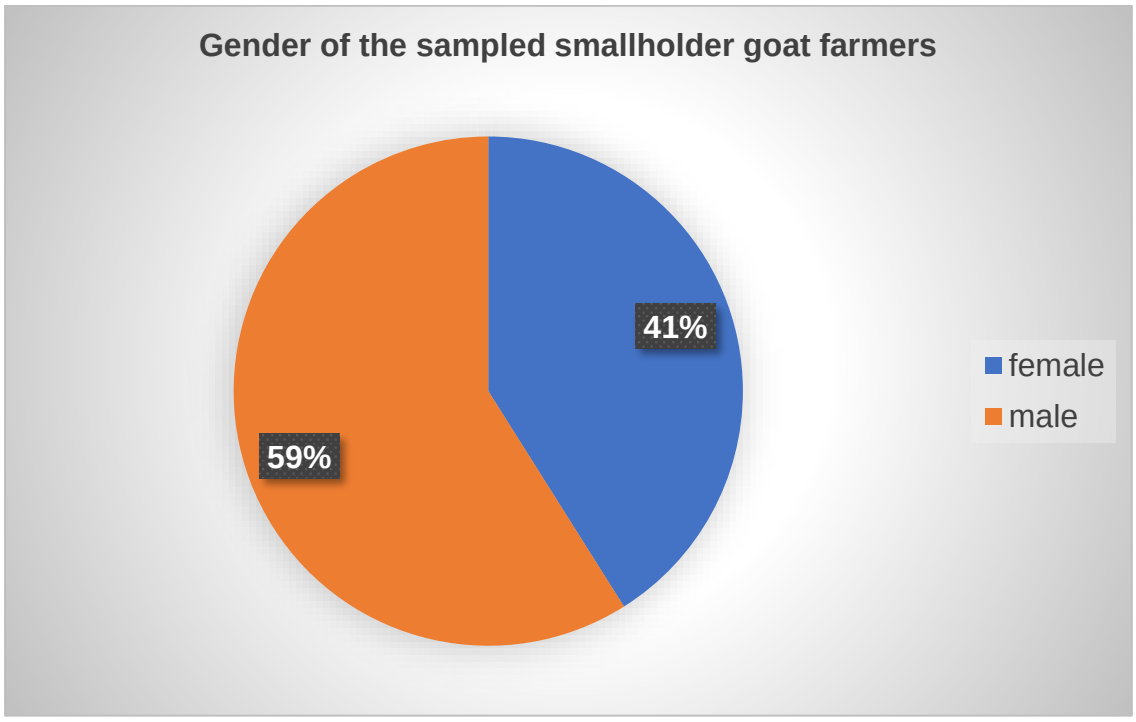
4.2. Descriptive statistics of the socio-economic characteristics (continuous variables)

Table 4.1: Continuous variables description of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province (n=95).

Variable	N	Min	Max	Mean	Standard Deviation
Age (years)	95	25	75	45.23	13.01
Household size (number)	95	2	12	5.36	2.52
Herd size (number)	95	3	45	12.51	8.04
Educational Level (years in school)	95	1	14	7.21	3.17
Farming experience (years)	95	1	21	6.92	4.559

The results obtained in Table 4.1 indicate that the average (mean) age of a smallholder goat farmer in Mamaila Village, Greater Letaba Local Municipality, is 45 years with a minimum of 25 years and a maximum of 75 years. Moreover, the average difference between the participants' age and the mean age is 13 years. This implies that most of the smallholder farmers in this study are within the age range of 32 to 58. The results further reveal that the average number of individuals occupying the smallholder goat farmers' households in Mamaila Village, Greater Letaba Local Municipality, is 5 headcounts with a minimum of 2 headcounts and a maximum of 12 headcounts. Additionally, the average herd size was 12 goats, with a minimum of 3 goats and a maximum of 45 goats. The average number of years smallholder goat farmers spent in school in Mamaila Village, Greater Letaba Local Municipality is 7 years, with a minimum of 1 year and a maximum of 14 years spent in school.

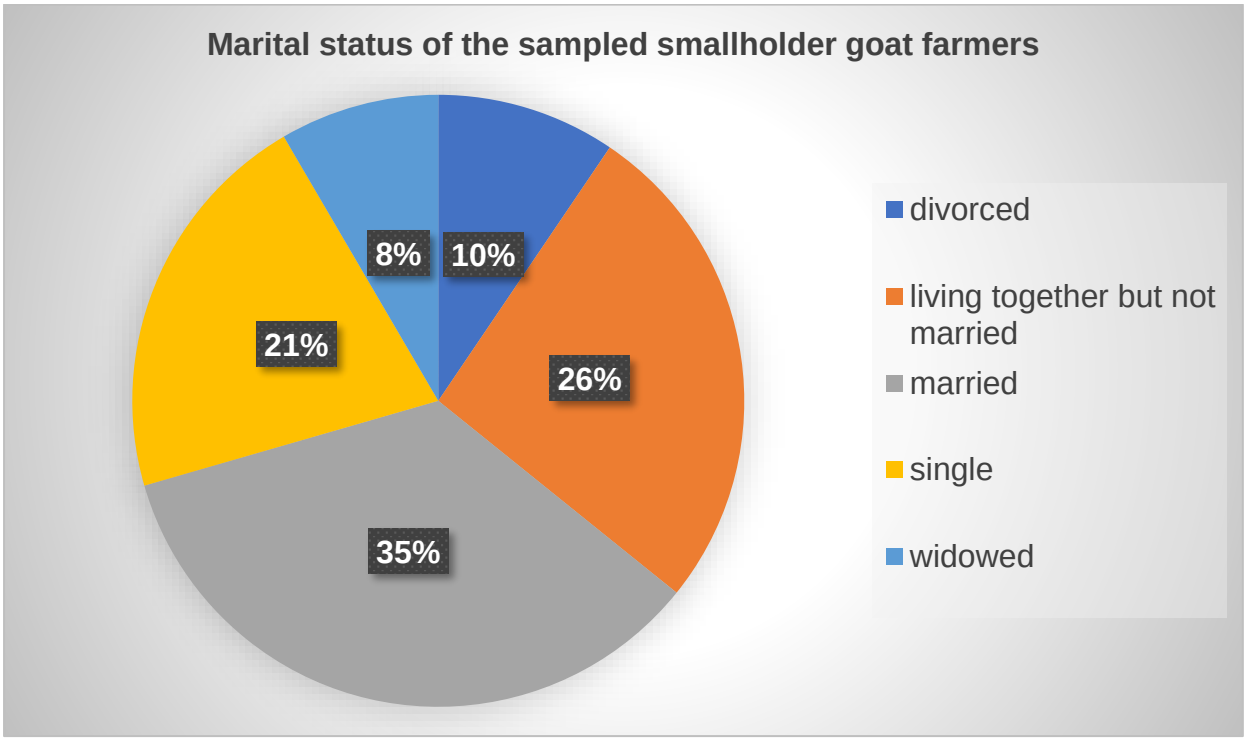
4.3. Descriptive statistics of categorical data



Source: Survey data (2024)

Figure 4.1: Gender of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province (n=95)

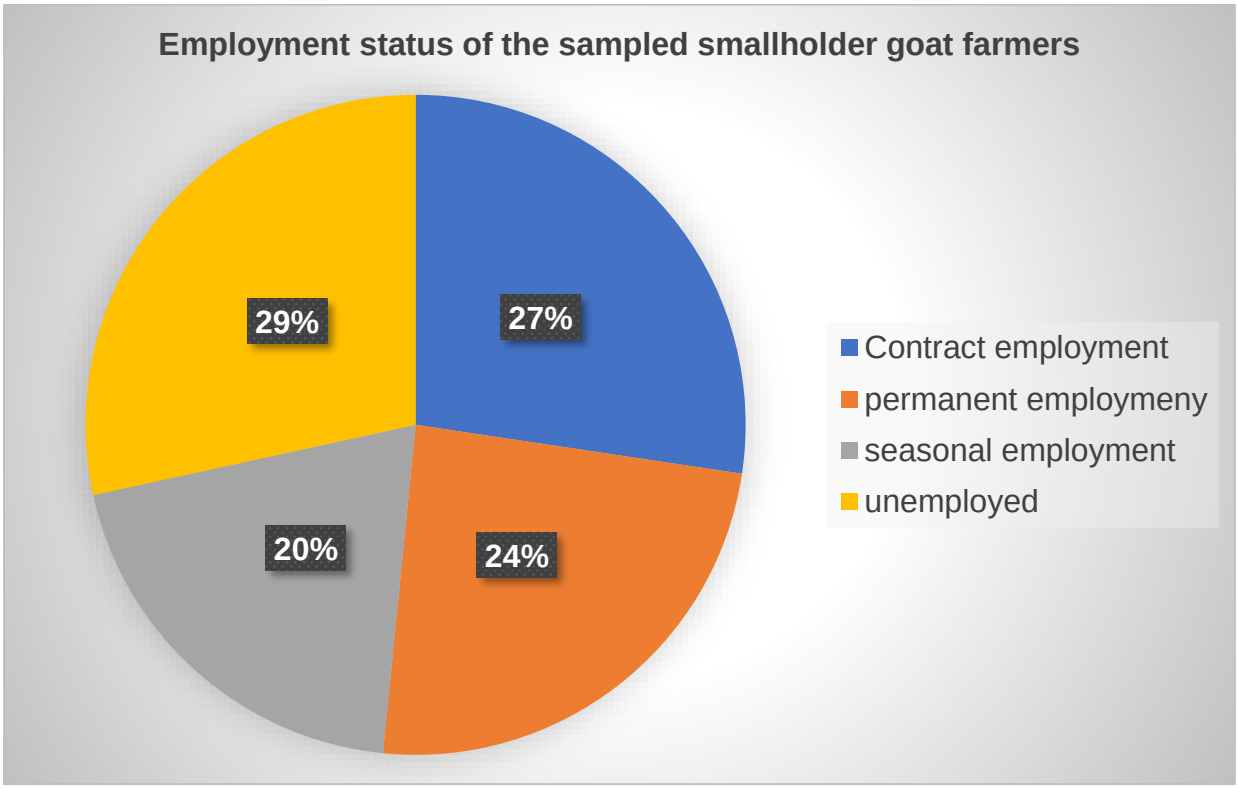
The gender distribution of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province, in Figure 4.1, reveals that 41% of the farmers are female and 59% are male. This implies that most smallholder goat farming families in Mamaila Village of the Greater Letaba Municipality are male-headed and female-headed families engaging in smallholder goat farming are fewer in proportion. Moreover, the results revealed that male smallholder goat farmers in the study are dominating the small-scale goat farming sector and are most likely to be the ones willing to participate in the agro-processing industry to add value to the products produced in their farms. The findings of this study are in line with a study conducted by Khoza *et al*., (2019), which revealed that men play a dominant role in the participation of agro-processing activities. On the contrary, Dumayiri *et al*., (2019) indicated that the agro-processing industry is dominated by more women than men among smallholder farmers.



Source: Survey data (2024)

Figure 4.2: Marital status of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province (n=95)

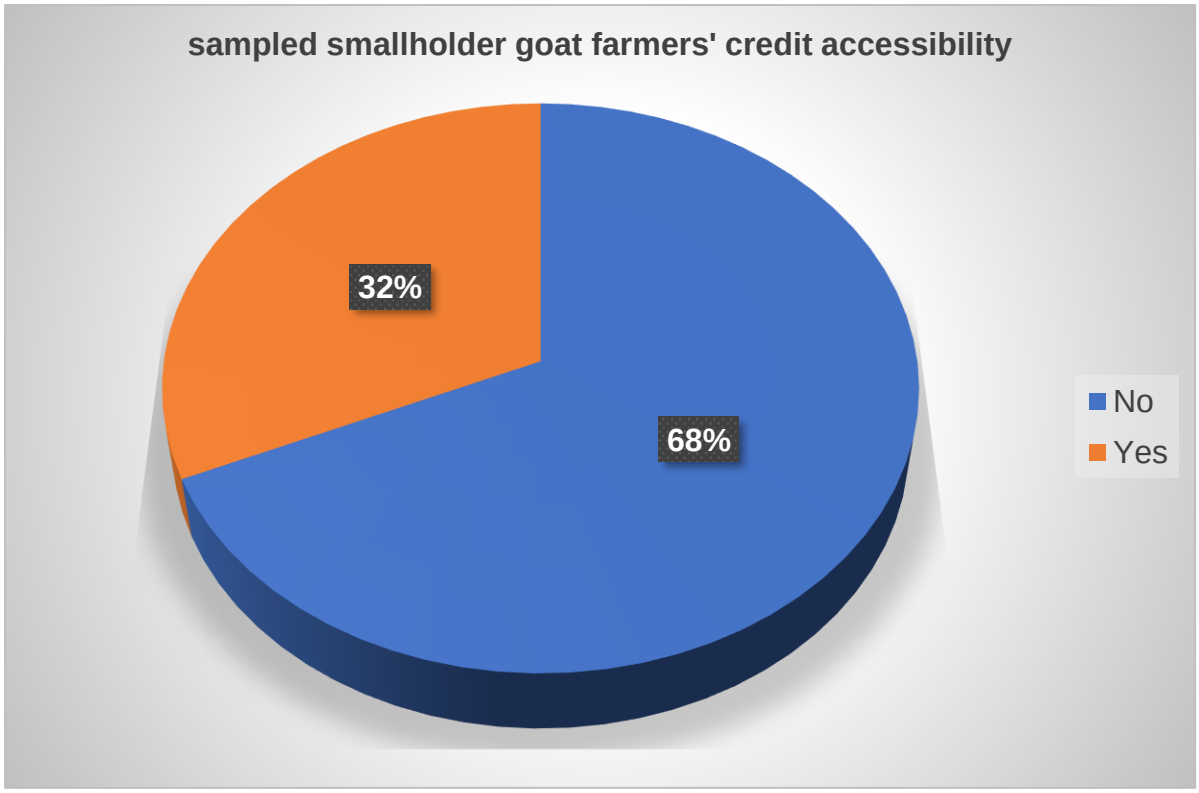
Figure 4.2 indicates the marital status of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province. The findings of this study revealed that the majority of the sampled smallholder goat farmers in Mamaila Village are married. A total of 95 smallholder goat farmers participated in the study, and 33 smallholder goat farmers are reported to be married, accounting for 35% of the sampled smallholder goat farmers. This may suggest that over one third of smallholder goat farmers in Mamaila Village engage in joint family decision-making, which has a huge impact on the smallholder goat farmers' perception and willingness to participate in the agro-processing industry. This is followed by 25 smallholder goat farmers who are living together but not married, making up 26% of the sampled smallholder goat farmers. Smallholder goat farmers that are single in Mamaila Village were 20, making 22% of the sampled smallholder goat farmers in the area. The proportion of divorced and widowed smallholder goat farmers is 9 and 8, making up approximately 9% and 8%, respectively.



Source: Survey data (2024)

Figure 4.3: Employment status of smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province (n=95).

Among the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province, 29% are unemployed, while 27% are engaged in contract employment. Additionally, 24% hold permanent jobs, and 20% are employed seasonally. This distribution indicates that the smallholder goat farmers in Mamaila Village have various income sources beyond goat farming, which suggests a level of economic diversification among these households.

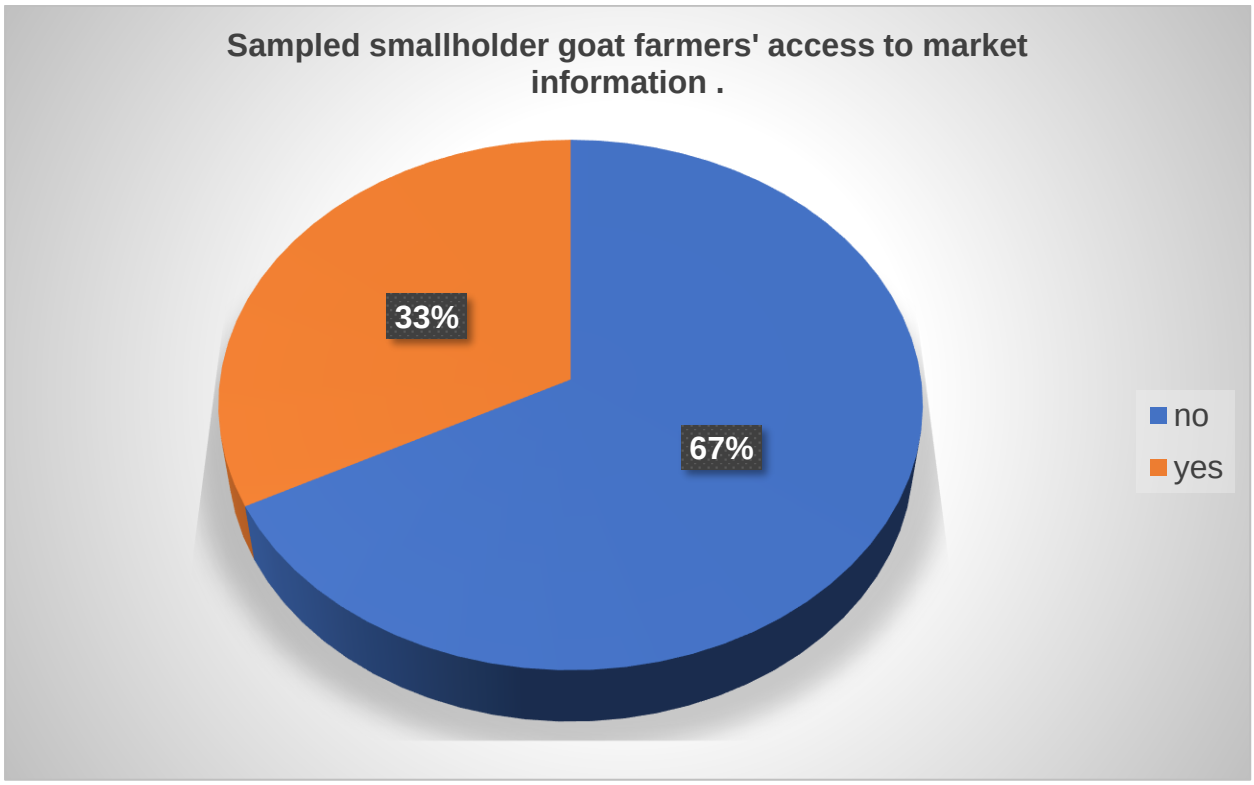


Source: Survey data (2024)

Figure 4.4: Sampled smallholder goat farmers' credit accessibility (n=95)

Figure 4.4 indicates the sampled smallholder goat farmers' accessibility to credit in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The findings of this study

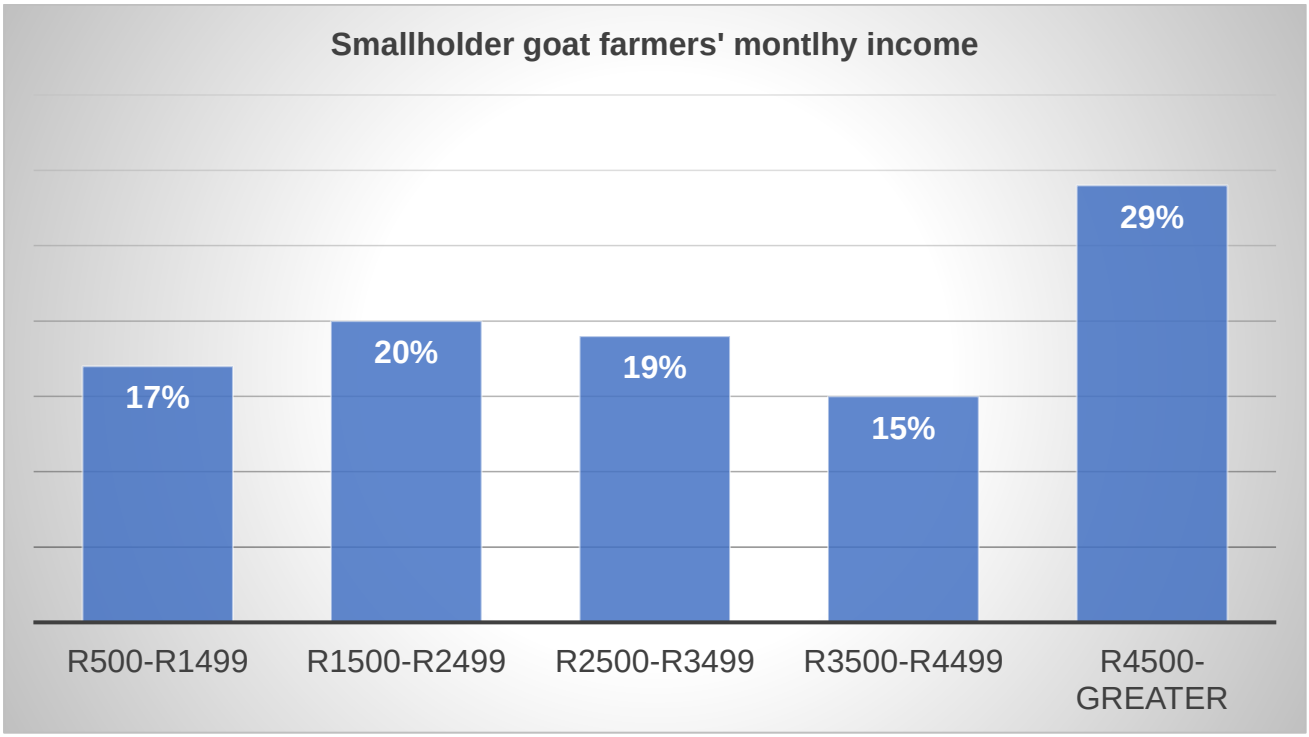
revealed that 68% of the sampled smallholder goat farmers do not have access to credit, while a smaller proportion of the smallholder goat farmers are accessing credit. The smallholder goat farmers with access to credit make up 32% of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. This is as a result of high level of unemployment in Mamaila village, Greater Letaba Local Municipality, Limpopo Province.



Source: Survey data (2024)

Figure 4.5: Sampled smallholder goat farmers' access to market information (n=95).

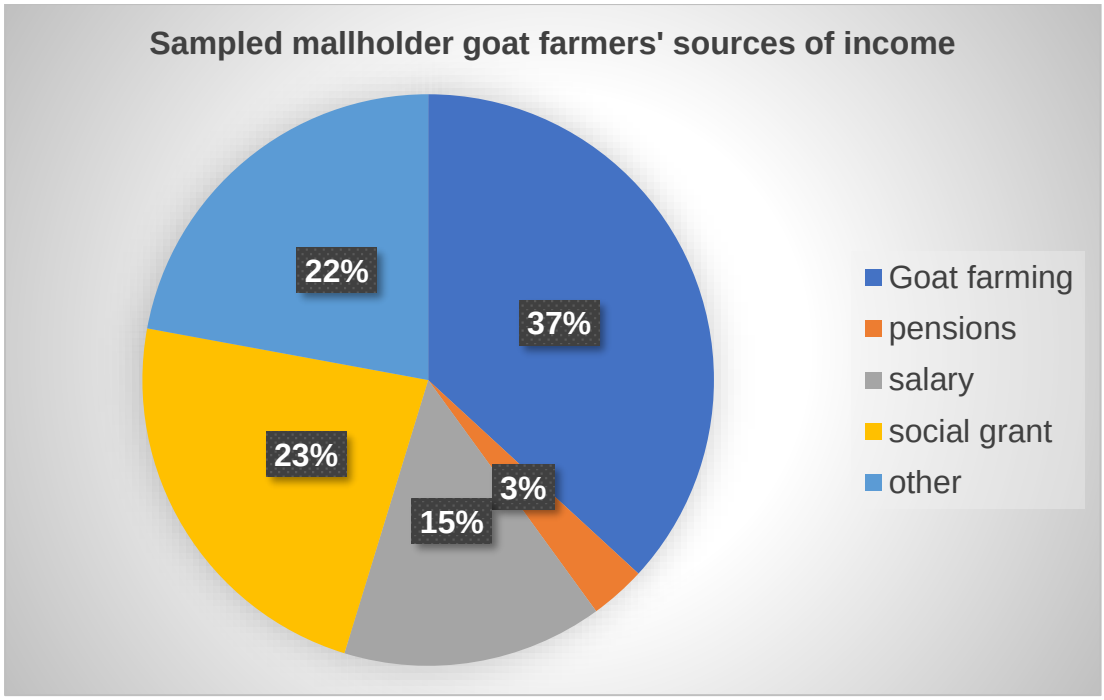
As per the findings of this study represented in Figure 4.5, the results reveals that 67% of smallholder goat farmers in Mamaila Village have access to market information and the remaining 32% of the smallholder goat farmers do not have access to market information. This implies that smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality face significant challenges due to limited access to market information, which restricts their participation in the agro-processing industry.



Source: Survey data (2024)

Figure 4.6: Household income of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province (n=95).

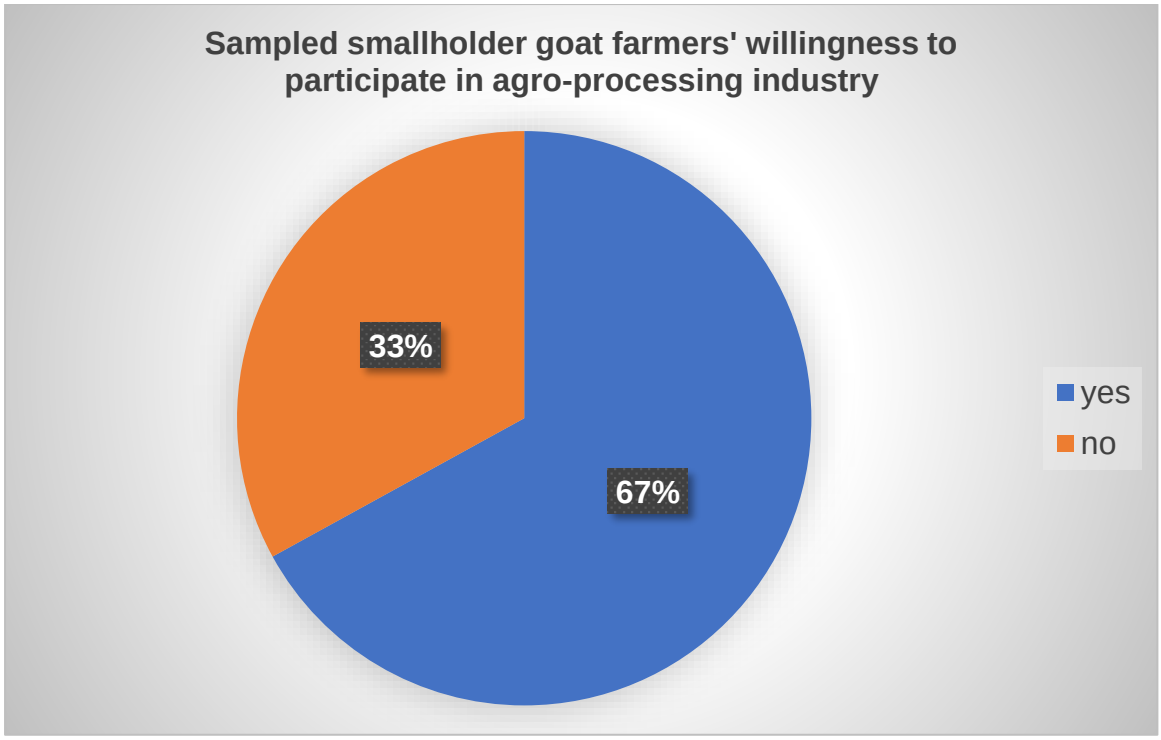
Low monthly income is a barrier for smallholder farmers, as it limits their ability to access essential resources like machinery, training, and materials for agro-processing (Mabe, 2020). Figure 4.6 indicates that 17 % of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality receive monthly income that ranges from R500 to R1499. Moreover, 20% of the sampled smallholder goat farmers receive monthly income that ranges from R1500 to R2499. Smallholder goat farmers in Mamaila Village face income constraints, which makes it challenging for them to add value to their produce to participate in the agro-processing industry. This is in line with the study of Nyawo and Olorunfemi (2023) who found that many smallholder farmers in Mpumalanga Province earn an average monthly income of around R500 to R2000, which restricts their ability to invest in resources like agro-processing machinery.



Source: Survey data (2024)

Figure 4.7: Sampled smallholder goat farmers' sources of income in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province (n=95).

The sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, derive their income from various sources. Figure 4.7 indicates that 37% of sampled smallholder goat farmers derive their income from goat farming, 23% from social grant, 22% from other agricultural or informal sources,15% from salary, and 3% from pension funds. These various sources outlined in Figure 4.7 underscore the limited income-generating options available to these smallholder goat farmers in Mamaila Village.

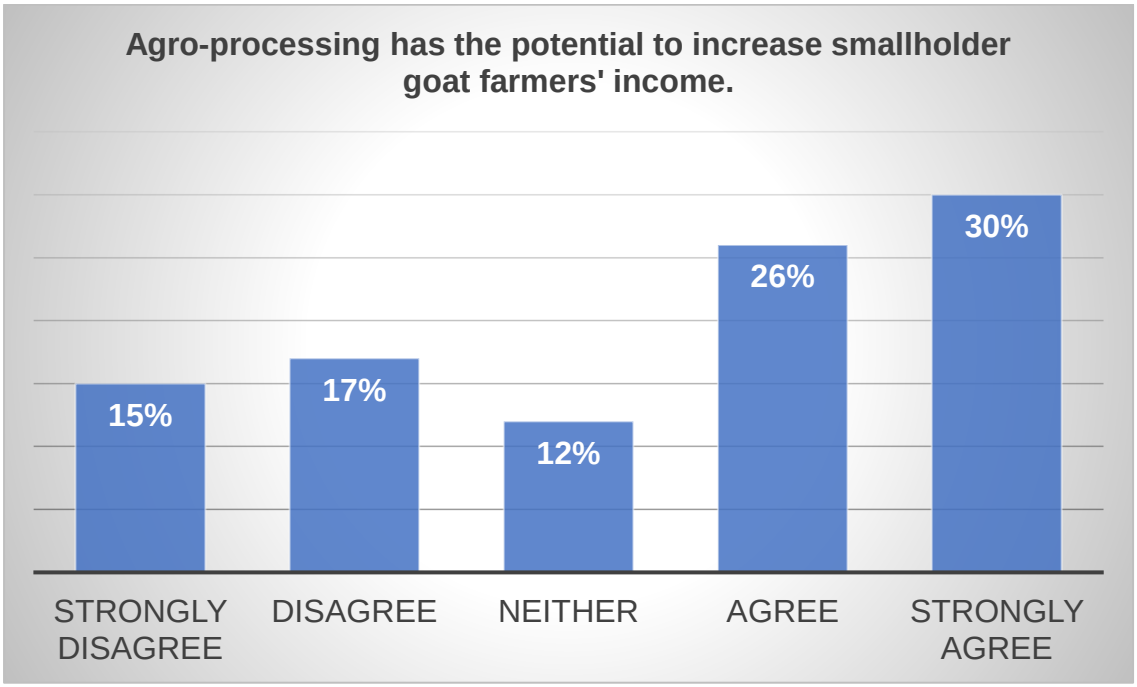


Source: Survey data (2024)

Figure 4.8: Sampled smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province (n=95).

Smallholder goat farmers' participation in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, can enhance income stability, increase farm productivity, and alleviate poverty in the area. Figure 4.8 indicates that 67% of the sampled smallholder goat farmers in Mamaila Village are willing to participate in the agro-processing industry, and 32% of the sampled smallholder farmers are not willing to participate in the agro-processing industry.

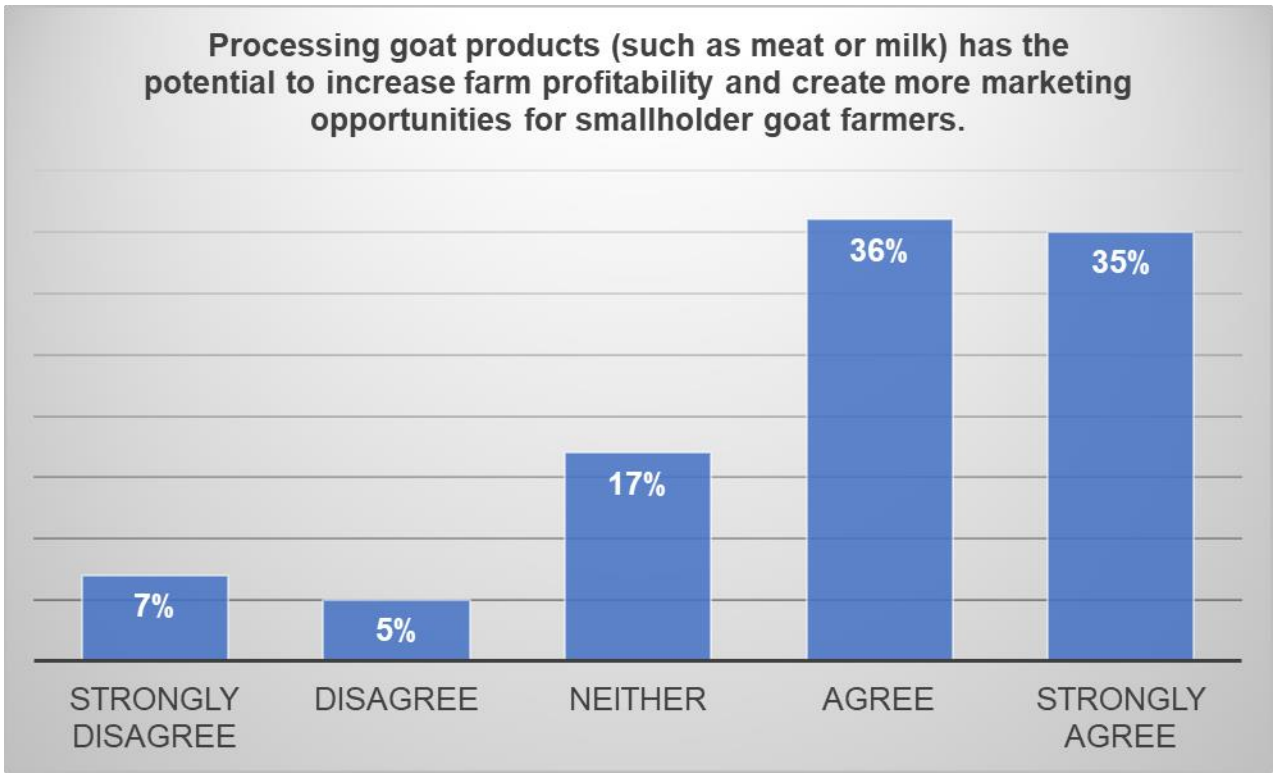
4.9. Sampled smallholder goat farmers' perceptions towards the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province



Source: Survey data (2024)

Figure 4.9: Sampled smallholder goat farmers' perception towards agro-processing's potential to increase income (n=95)

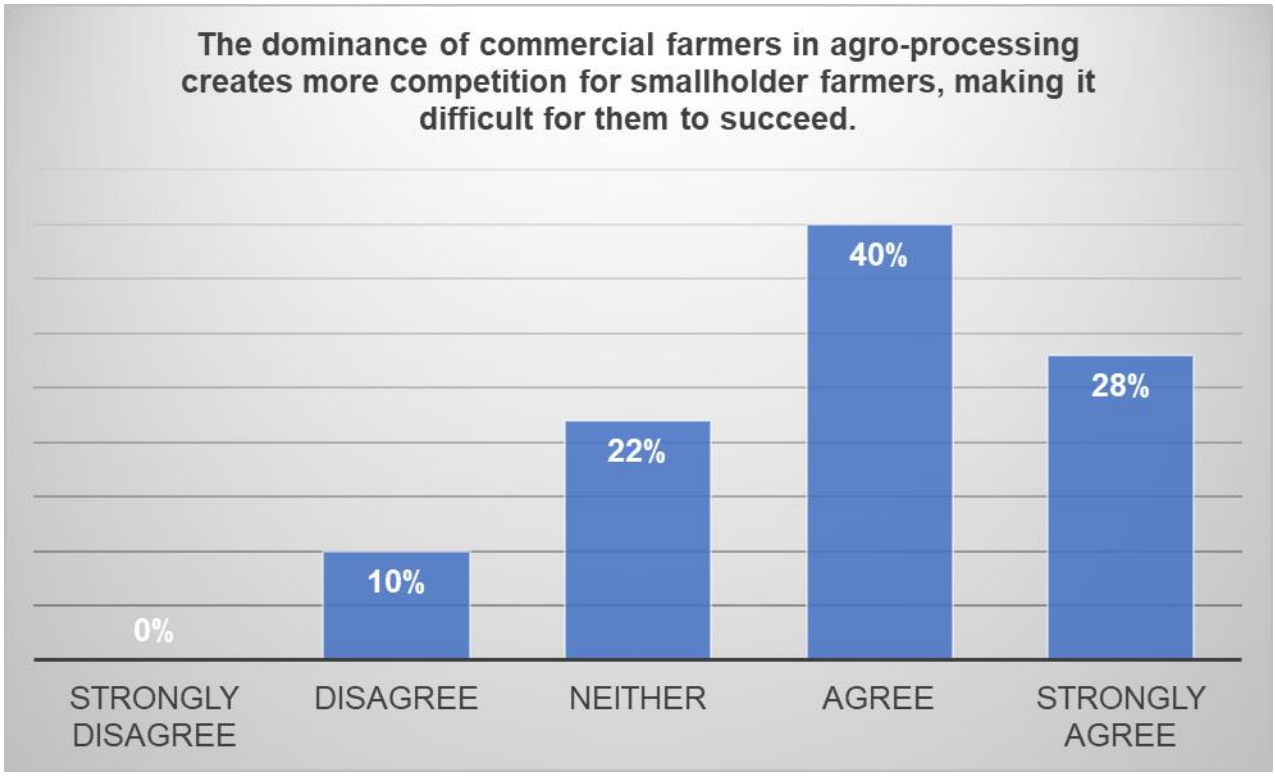
Figure 4.9 reveals that a significant majority of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality (26% agree and 30% strongly agree) perceive the agro-processing industry as a positive economic opportunity to increase their levels of income. This suggests a generally positive perception towards the agro-processing's potential for income enhancement. However, some of the sampled smallholder goat farmers disagreed (17%) and strongly disagreed (15%), which implies that there are concerns or barriers among these smallholder goat farmers. A study conducted by Baiphethi and Jacobs (2009) revealed that smallholder farmers often see agro-processing as a means to alleviate their income levels through value addition, but limited access to financing and market information creates hesitations, especially for smallholder farmers in rural areas.



Source: Survey data (2024)

Figure 4.10: Sampled smallholder goat farmers' perception towards the potential of agro-processed products to increase farm profitability and create more marketing opportunities (n=95).

Figure 4.10 indicates that 71% of the sampled smallholder goat farmers (36% agree and 35% strongly agree) perceive agro-processing as an industry with the potential to increase farm profitability and create more marketing opportunities. This positive perception suggests strong recognition of the economic benefits that agro-processing could create for smallholder farmers, especially in rural areas. However, with 17% of the sampled smallholder goat farmers on neutral, and 12% expressing disagreement (5% disagree and 7% strongly disagree), this implies that some of the smallholder goat farmers remain sceptical about participating in the agro-processing industry.



Source: Survey data (2024)

Figure 4.11: Sampled smallholder goat farmers' perceptions towards market competition created by commercial farmers in the agro-processing industry (n=95)

Commercial farmers often benefit from better access to high value-addition markets, capital, and infrastructure, which place smallholder farmers at a disadvantage. According to Hall and Cousins (2018), commercial farmers tend to dominate formal markets and agro-processing facilities, which creates competitive pressures that are difficult for smallholder farmers to overcome. Figure 4.11 reveals a considerable level of concern among sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, with 68% of the smallholder farmers (40% agree and 28% strongly agree) perceiving that commercial dominance poses competitive challenges. This implies that majority of smallholder goat farmers are reluctant to participate in agro-processing due to barriers created by commercial farmers that limit opportunities for smallholder farmers.

CHAPTER FIVE

EMPIRICAL RESULTS AND DISCUSSIONS

5.1. Introduction

This chapter provides empirical results on the factors influencing smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The chapter represents the results of Binary Logistic regression model and marginal effects.

Table 5.1: Diagnostics to assess the degree of multicollinearity and heteroskedasticity among variables

Explanatory variables	**Collinearity Statistics**	
	VIF	**1/VIF**
Age	2.40	0.42
Gender	1.47	0.68
Marital status	1.83	0.55
Educational level	2.88	0.35
Employment status	1.17	0.85
Household size	1.34	0.75
Household income	1.10	0.91
Herd size	1.69	0.59
Access to credit	1.57	0.64
Market information	1.29	0.78
Market distance	2.17	0.46
Farming experience	1.73	0.58
Mean VIF	**1.72**	**0.63**
Variable $\chi 2$	Prob > $\chi 2$	Tabulated $\chi 2$ value
Willingness to participate	1.89 0.752	3.84

To test for multicollinearity, the variance inflation factor (VIF) was conducted for the above variables. The baseline is that if the variable inflation factor exceeds 10 then there is a multicollinearity problem. The VIFs for all variables were less than 10, with an average of 1.72 and an inverse variance inflation factor of 0.63. This shows that the above econometric problem did not exist among the variables. The degree of multicollinearity was assessed using IBM SPSS Version 28.00 package software. The Breusch-Pagan/Cook-Weisberg was used to test for heteroscedasticity. The results revealed that there was no heteroscedasticity because $\chi 2$ value 1.89 was significantly lower than the tabulated $\chi 2$ value 3.38 at 5% significance level and one degree of freedom as shown in the last rows of Table 5.1.

5.2. Binary Logistic regression model results

Table 5.2: Binary logistic regression model results of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province (n=95)

Parameter	B Coef.	SE	Wald	dy/dx
Constant	-4.827	1.224	3.943	-
Age	3.179***	0.48	6.623	0.031
Gender	0.693*	0.340	2.038	0.043
Marital status	-1.757	1.674	1.049	0.025
Education	0.493	0.472	1.044	0.029
Employment status	0.460	0.462	0.995	0.037
Household size	-1.401**	0.538	2.604	0.039
Household income	1.569*	0.758	2.069	0.033
Herd size	1.227***	0.413	2.971	0.023
Access to credit	-1.181**	0.462	2.556	0.017
Market information	1.558**	0.550	2.832	0.048
Market distance	-2.682	2.412	1.113	0.071
Farming experience	1.048***	0.283	3.703	0.057
Model summary				
-2 Log likelihood	Cox & Snell R square		Nagelkerke R square	
37.392[a]	0.784		0.791	
Notes: *, **, * means statistically significant at 10%, 5% and 1% respectively. Accuracy of prediction: overall (%): 96.1**				

The results in Table 5.2 above show how the hypothesised socio-economic characteristics (age, gender, marital status, educational level, employment status, household size, household income), institutional characteristics (market distance), farming characteristics (Farming experience, herd size,) and support services (market information, access to credit) influence sampled smallholder goat farmers' willingness to participate in the agro-processing industry. The 12 hypothesised variables that influence the sampled smallholder goat farmers' willingness to participate in the agro-processing industry were empirically tested. The value of the log likelihood 37.392[a] indicate that specifications of the model provided a good fit to the data. The estimated log likelihood ratio statistics of 37.392[a] is highly statistically significant and it shows that independent variables explain variation in the sampled smallholder goat farmers' willingness to participate in the agro-processing industry.

The model is relatively good, with an estimated Cox and Snell and Nagelkerke R squares at 0.784 and 0.791, respectively. The goodness-of-fit of the model is satisfactory because 78% and 79% explain the change in the dependent variable (WTP- willingness to participate) whereas the remaining 22% and 21% are not explained in the model. The estimated coefficients and level of statistical significance results show that most of the independent variables affected the probability of a smallholder goat farmer's willingness to participate in the agro-processing industry. As shown in Table 5.2 above, 8 variables are statistically significant, and these variables influence the sampled smallholder goat farmers' willingness to participate in the agro-processing industry. The statistically significant variables are age, gender, household size, household income, herd size, access to credit, market information, and farming experience.

5.3. Discussion of significant variables

5.3.1. Age of sampled smallholder goat farmers in Mamaila village, Greater Letaba Local Municipality, Limpopo Province

The age of the sampled smallholder goat farmer is highly statistically significant at 1% level of significance and was found to have a positive effect on sampled smallholder goat farmers' willingness to participate in the agro-processing industry. This implies that a year increase in the age of a sampled smallholder goat farmer will increase the likelihood of willingness to

participate in the agro-processing industry by 3.1%. These findings are in line with the study of Ayamga (2006) who found that the willingness to participate in multi-stakeholder platforms by smallholder farmers is relatively higher among the economically active age group. Additionally, the findings of this study concur with Ngore *et al*., (2011), who revealed that an increase in the age of a smallholder farmer by one year increases the probability of adding value by 1.57% due to an increase in access to resources that is closely related to age, particularly in traditional societies where resources are passed on through inheritance. On the contrary, the findings of this study oppose that of Adepoju *et al*., (2015) who revealed that age had a negative impact on smallholder farmers' market participation in the sorghum markets. To support this, Berem *et al*., (2010) found that age is inversely related to the probability of one engaging in value addition because as one advances in age, they become risk averse and thus tend to avoid new ventures, on whose performance they are not certain.

5.3.2. Gender of sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.

The binary logistic regression model results in Table 5.2 indicates that gender is statistically significant at 10% level of significance and was found to have a positive effect on the sampled smallholder goat farmers' willingness to participate in the agro-processing industry. The descriptive results of this study revealed that 59% of the sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality are male and 41% are female. Therefore, Binary logistic regression model results of this study revealed that male smallholder goat farmers are more likely willing to participate in the agro-processing industry. This implies that a unit increase in the number of male-headed smallholder goat farmers as opposed to female-headed increases the likelihood of their willingness to participate in the agro-processing industry by 4.3%. This finding is in line with the study of Senyolo *et al*., (2018) who revealed that male smallholder farmers have a dominant participation in the agro-processing industry. Consequently, Bert and Kibet (2014) suggested that male-headed households are more market-oriented than female-headed ones; hence they participate more in the market for livelihood and for income. In contradiction, Dumayiri *et al*., (2024) indicated that the agro-processing industry is highly dominated by female smallholder farmers.

5.3.3. Household size of sampled smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province

The household size of sampled smallholder goat farmers is statistically significant at 5% level of significance and was found to have a negative effect on smallholder goat farmers' willingness to participate in the agro-processing industry. This implies that a unit increase in the number of headcounts in smallholder goat farmers' household in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province, decreases the likelihood of their willingness to participate in the agro-processing industry by 3.9%. This is supported by Mathobela *et al*., (2021) who remarked that an additional household member decreases the likelihood of smallholder farmers commercialising and participating in formal markets. The study further argued that large household sizes detract households from market orientation due to its effect on increasing household domestic consumption needs. On the contrary, Agrawal and Gupta (2005) found that household size has a strong positive relationship with levels of participation in the agro-processing industry.

5.3.4. Household income of smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province.

The results obtained in Table 5.2 revealed that household income is statistically significant at 10% level of significance and was found to have a positive effect on smallholder goat farmers' willingness to participate in the agro-processing industry. This implies that a unit increase in the monthly income of a sampled smallholder goat farmer in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province increases the likelihood of their willingness to participate in the agro-processsing industry by 3.3%. The results are in line with the findings of Hassan and Nhemachena (2008), who found that an increase in income level promotes smallholder farmers' participation in value addition markets.

5.3.5. Herd size of smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province

Binary Logistic regression results of smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, revealed that herd size is statistically significant at 1% level of significance. There is a positive relationship between the herd size of the sampled smallholder goat meat farmers and their willingness to participate in the agro-processing industry. This implies that a unit increase in the herd size of smallholder goat farmers increases the likelihood of their willingness to participate in the agro-processing industry by 2.3%. To support this, Fidzani (1993) indicated that large herd sizes generate higher marketable surplus than small herds, which results in smallholder farmers with large herd sizes dominating the value-addition markets. Moreover, this finding is in line with that of Barrett (2008) and Nkhori (2004) who indicated that the more farmers increase their total herds, the more they become more profitable, efficient and willing to gain more knowledge in terms of management practices that will reduce mortalities and improve production and their participation the agro-processing value addition markets.

5.3.6. Access to credit by smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province

Credit accessibility has a positive influence on smallholder farmers' decision to participate in the agro-processing industry (Thindisa *et al*., 2018). The results obtained in Table 5.2 revealed that access to credit is highly significant at 5% level of significance. There is a negative relationship between smallholder goat farmers' accessibility to credit and their willingness to participate in the agro-processing industry. This implies that a unit increase in access to credit by smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province increases the likelihood of their willingness to participate in the agro-processing industry by 1.7%. The findings of this study are in contradiction to those of Okello *et al.* (2019), who found that access to credit positively influenced farmers' capacity to invest in value-adding activities.

5.3.7. Market information received by smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province.

The Binary logistic regression model results of the smallholder goat farmers in Mamaila village, Greater Letaba Local Municipality, indicated that market information is statistically significant at 5% level of significance. There is a positive relationship between smallholder goat farmers' accessibility to market information and their willingness to participate in the agro-processing. This implies that a unit increase in the market information received by smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province increases the likelihood of their willingness to participate in the agro-processing industry by 4.8%. The findings of this study are in line with the study of Coetzee *et al*., (2004), who discovered that the provision of market information strengthens farmers 'negotiating ability during transactions with buyers, preventing possible exploitation by better-informed buyers. To support this, Nkhori (2004) indicated that farmers with access to market information have better chances to make more profitable sales than those who lack relevant market information. Additionally, Zeberga (2010) shared that smallholder farmers who have regular contact with extension officers to receive market information are more likely to know about production, quality, and price of inputs, which would increase in the likelihood of their willingness to participate in the agro-processing industry.

5.3.8. Farming experience of smallholder goat farmers in Mamaila Village, Greater Letaba Local municipality, Limpopo Province.

Binary logistic regression results of the smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality indicated that farming experience is statistically significant at 1% level of significance. There is a positive relationship between the farming experience of the sampled smallholder goat farmers and their willingness to participate in the agro-processing industry. The farming experience of smallholder goat farmers contributes positively to their willingness to participate in the agro-processing industry with a marginal effect of 0.057, which implies that a unit increase in the farming experience of smallholder goat farmers increases the likelihood of their willingness to participate in the agro-processing industry by 5.7%. These findings concur with those of Okoye *et al*., (2009) and Tarawali *et al*., (2012), who found that

farming experience positively influences smallholder farmers' participation in the agro-processing industry.

5.4 Summary

This chapter provided the empirical results of the study and discussed the smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. Additionally, the results of Binary Logistic regression model were discussed in detail for both significant and insignificant variables which are summarised in the final chapter of this study.

CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

6.1. Introduction

This chapter summarises the discussion of the results of the study and gives a conclusion. It summarises the empirical results of the Binary logistic regression model. Moreover, it discusses the policy recommendations that would be suitable for the smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. It also addresses policy recommendations for other smallholder goat farmers who are willing to participate in the agro-processing industry or already participating in the agro-processing industry to enhance their farm productivity and to increase their level of income.

6.2. Conclusion

The study used three objectives to analyse and assess smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. For this reason, the study further used two hypotheses to predict the outcome of the results. The first hypothesis was that there is no difference in the level of perceptions amongst smallholder goat farmers towards the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. This hypothesis is rejected because the Likert scale results revealed that some of the smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality believe that participating in the agro-processing industry is important and has the potential to enhance farm productivity and improve their level of income. On the other hand, some smallholder goat farmers in Mamaila Village indicated that there are a lot of risks associated with participating in the agro-processing industry and that the industry is highly dominated by commercial farmers which reduces their chances of thriving in the agro-processing industry. Therefore, there is a difference in the level of perceptions amongst smallholder goat famers towards the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The second hypothesis was that socio-economic factors do not

significantly influence smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. This hypothesis is rejected because the Binary logistic regression model results revealed that factors such as age, gender, household size, household income, herd size, access to credit, market information and farming experience significantly influence smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.

6.3. Summary

The study was conducted in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The purpose of the study was to generate knowledge on smallholder goat farmers' perceptions and willingness to participate in the agro-processing industry, Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. The study had three objectives to address, and these objectives were to profile the socio-economic characteristics of smallholder goat farmers, to assess the level of perceptions of smallholder goat farmers towards the agro-processing industry, and to analyse the socio-economic factors influencing smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. For this reason, the study hypothesised that there is no difference in the level of perceptions among smallholder goat farmers towards the agro-processing industry, and that the socio-economic factors do not influence smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province.

Descriptive statistics was used to identify and describe the socio-economic characteristics of smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality. The results of the descriptive statistics revealed that Mamaila Village, Greater Letaba Local Municipality is dominated by male smalholder goat farmers (59%) as opposed to female smallholder goat farmers (41%). The descriptive statistics results further indicated that only 67% of smallholder goat farmers are willing to participate in the agro-processing industry in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province. Binary Logistic regression model was used to analyse the socio-economic factors influencing smallholder goat farmers' willingness to participate in the agro-processing in Mamaila Village, Greater Letaba Municipality,

Limpopo Province. Binary logistic regression model results revealed that factors such as age, gender, household size, household income, herd size, access to credit, market information and farming experience have a statistically significant effect on smallholder goat farmers' willingness to participate in the agro-processing industry. Moreover, the Likert scale was used to measure the degree to which smallholder goat farmers agree or disagree to a specific statement to assess smallholder goat farmers' level of perceptions on the agro-processing industry, its overall performance, and benefits. The results revealed that most smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality agree that the agro-processing industry has the potential to enhance farm productivity and increase their level of income.

6.4. Policy Implications and Recommendations

Age: Increased involvement of youth in agriculture.

- One of the findings of this study is that the average age of the smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality, Limpopo Province is 45 years which implies that the study area is highly dominated by smallholder goat farmers between the ages of 45 years and above. It is therefore recommended that active and informed participation of youth in the agro-processing industry be encouraged through co-operatives, equity partnerships, and development projects.

Gender: Support for smallholder female farmers

- Based on the gender distribution of smallholder goat farmers in Mamaila Village, policies should aim to enhance support for female farmers by providing targeted financial assistance, resources, and training to increase their participation in both farming and agro-processing. Moreover, encouraging gender inclusion in agro-processing through incentives and mentorship programmes could promote equal opportunities for value addition activities. Additionally, capacity-building initiatives focusing on sustainable farming, business skills, and financial access should address the specific needs of both male and female farmers, ensuring equal access to resources, training, and credit. Additionally, community-based cooperatives can foster collaboration and provide shared access to markets, strengthening the agricultural value chain.

Household income: Introduce income support and subsidy programmes

- Providing income support and subsidy programmes for smallholder farmers to access agro-processing resources. Providing targeted subsidies or low-interest loans for machinery, training, and materials would help farmers overcome income constraints, making it easier for them to add value to their produce and engage in the agro-processing industry.

Farming experience: Targeted support programmes for smallholder goat farmers

- The findings of this study highlighted the significant variation in perceptions and willingness among smallholder goat farmers towards the agro-processing industry. Some of the smallholder goat farmers see potential benefits, while others are concerned about risks and competition from commercial farmers. It therefore recommended that the government implement targeted support programmes that address specific concerns and needs of smallholder goat farmers in Mamaila Village, Greater Letaba Local Municipality. These targeted support programs could provide training on agro-processing techniques and establish mentorship programmes linking smallholder goat farmers with successful agro-processors to share knowledge and best practices.

Access to credit and market information: Improvement in access to resources

- Socio-economic factors such as access to credit, and market information significantly influence smallholder goat farmers' willingness to participate in the agro-processing industry. It therefore recommended that the government develop financial support schemes tailored for smallholder farmers, including low-interest loans and grants specifically for agro-processing ventures. The government should strengthen information dissemination platforms to provide up-to-date market trends, prices, and consumer preferences.

6.5. Recommendations for further research

The findings of this study are specifically relevant to Mamaila Village, Greater Letaba Local Municipality in Limpopo Province. It is therefore recommended that similar studies be conducted in other smallholder farming areas of South Africa to establish more information on Smallholder goat farming in the agro-processing industry. Further investigations should focus on opportunities available for smallholder goat farmers in the agro-processing industry. Moreover, the focus can also be on evaluating the effectiveness and impact of risk management and insurance programmes specifically designed for smallholder goat farmers engaged in the agro-processing industry.

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APPENDIX A: CONSENT LETTER and FORM

University of Limpopo

CONSENT TO PARTICIPATE IN RESEARCH

TITLE OF RESEARCH PROJECT: SMALLHOLDER GOAT FARMERS' PERCEPTIONS AND WILLINGNESS TO PARTICIPATE IN THE AGRO PROCESSING INDUSTRY: A CASE STUDY OF MAMAILA VILLAGE, GREATER LETABA MUNICIALITY, LIMPOPO PROVINCE.

Dear Participant,

You are requested to participate in above-mentioned research study conducted by Tshepiso Florence Matlala (Department of Agricultural Economics and Animal Production, University of Limpopo). You were selected as a participant in this study as you are a smallholder goat farmer in Mamaila Village, Greater Letaba Municipality, Limpopo Province.

1. PURPOSE OF THE STUDY

This research project aims to analyse smallholder goat farmers' perceptions and willingness to participate in the Agro-processing industry in Mamaila Village, Greater Letaba Municipality, Limpopo Province); Profile the socio-economic characteristics of smallholder goat farmers, Assess the level of perceptions of smallholder goat farmers towards the agro-processing industry and analyse the socio-economic factors influencing smallholder goat farmers' willingness to participate in the agro-processing industry in Mamaila Village, Greater Letaba Municipality, Limpopo Province.

2. PROCEDURES

As the investigator, you will be interviewed by me, and you will volunteer to participate in this study. I would kindly ask you to Agree to be interviewed. The study consist of socio-economic characteristics, socio-economic factors and agro-processing information .

3. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

This research will help in assessing the perceptions of smallholder goat farmers towards the agro-processing industry and help to identify socio-economic factors influencing their willingness to participate in the agro-processing industry. This study will contribute to the establishment of possible solutions that will enhance smallholder goat farmers' participation in the agro-processing industry.

4. CONFIDENTIALITY

Information obtained from the participants during the study will remain confidential and will be disclosed only with your permission. Confidentiality of all the Survey data will be maintained by the investigator and the identity of the respondents will not be revealed in the research report.

5. PARTICIPATION AND WITHDRAWAL

You can choose whether to participate in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigators may withdraw you from this research if circumstances arise that warrant doing so.

6. IDENTIFICATION OF INVESTIGATORS

In situation where you have any questions or concerns about the research, please feel free to contact the project leader:

Project leader: Dr MA Nkoana
E-mail: andrias.nkoana@ul.ac.za
Contacts: +27 62 461 0512

7. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact: Mr Abdul Maluleke [Abdul.Maluleke@ul.ac.za]; 015 268 2306 at the University of Limpopo Research office.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by …… (Enumerator) I was given the opportunity to ask questions and these questions were answered to my satisfaction. I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

_____

Name of Subject/Participant

_____ _____

Signature of Subject/Participant **Date:**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ [*name of the subject/participant.* He/she was encouraged and given ample time to ask me any questions.

Signature of Investigator :_____**Date:**_____

APPENDIX B: QUESTIONNAIRE

TITLE: SMALLHOLDER GOAT FARMERS' PERCEPTIONS AND WILLINGNESS TO PARTICIPATE IN THE AGRO-PROCESSING INDUTRY: A CASE STUDY OF MAMAILA VILLAGE, GREATER LETABA MUNICIPALITY, LIMPOPO PROVINCE.

Student Name: MATLALA TF **Supervisor:** DR MA NKOANA **Co-supervisor:** DR LJ LEDWABA

Note to respondents:

The information captured in this questionnaire is strictly confidential and is intended for use in research purposes at the University of Limpopo, Turfloop campus. Participation in this survey is voluntary and respondents are free to withdraw from the study at any time if they wish to do so. This survey is to be completed by smallholder goat meat farmers in Mamaila Village, Greater Letaba Municipality, Limpopo Province only.

Please mark with X to indicate consent for the survey.

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

Questionnaire particulars	
Enumerator's name	
Respondent's name	
Date	
Signed at (area)	
Questionnaire reference no	

Please use X to complete where applicable

Questions with (*) are compulsory

SECTION A: SMALLHOLDER GOAT FARMERS' DEMOGRAPHIC CHARACTERISTICS.

a. kindly indicate your age (in years) *

b. What is your gender? *

1. Male	
2. Female	

c. What is your marital status? *

1. Married	

2.Living together but not married	
3.Single	
4.Divorced	
5.widowed	

d. what is your educational level (the number of years in schooling)? *

e. what is your employment status? *

1. employed	
2.self employed	
3. unemployed	

f. what is your household size? * Hint: household size refers to the household members who live, cook and eat the same food stock together in the household for at least the last six months.

SECTION B: KEY HOUSEHOLD SOCIO-ECONOMIC CHARACTERISITICS OF SMALLHOLDER GOAT FARMERS IN MAMAILA VILLAGE, GREATER LETABA MUNICIPALITY, LIMPOPO PROVINCE.

a. What is household income on a monthly basis? *

b. Please provide information on your major sources of monthly household income. *

Household income sources	Not applicable	1. R0-R499	2. R500-R1499	3. R1500-R2499	4. R2500-R3499	5. R3500-R4499	6. R4500 and greater

Goat production							
Pensions							
Salary /formal employment							
Relatives							
Social grants							
Other: specify							

SECTION C: FARM CHARACTERISTICS

a. Farm size (in hectares) *	b. Herd size (number of livestock) *	c. Labour employed in a farm*	d. Access to land*	e. Access to credit*	f. Access to transport *	g. Market information *	h. Farming experience *	I. Distant to market *
			1. yes	1. yes	1. yes	1. yes		
			2. no	2. no	2. no	2. no		

SECTION D: PERCEPTIONS OF SMALLHOLDER GOAT FARMERS TOWARDS AGRO-PROCESSING INDUSTRY.

Note: circle the correct answer, e.g. ©,

Agro-processing has the potential to increase smallholder goat farmers' income.

a. Strongly disagree
b. Disagree
c. Neither
d. Agree
e. Strongly agree

Processing goat products such as meat or milk has the potential to increase farm productivity and create more marketing opportunities for smallholder goat farmers.

a. Strongly disagree
b. Disagree
c. Neither
d. Agree
e. Strongly agree

The dominance of commercial farmers in agro-processing creates more competition for smallholder farmers, making it difficult for them to succeed.

a. Strongly disagree
b. Disagree
c. Neither
d. Agree
e. Strongly agree

SECTION E: WILLINGNESS TO PARTICIPATE IN THE AGRO-PROCESSING INDUSTRY.

a. Are you currently adding value to your agricultural produce (goat meat)? *

1. Yes	
2. No	

If No, are you willing to participate in the agro-processing industry?. *

1. Yes	
2. No	

Thank you for your time and participation in this study!!!!!!!!!!!!!!!!

APPENDIX C: CERTIFICATE OF EDITING

Florence certificate

Independent Editor

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CERTIFICATE OF EDITING

This confirms that I edited substantively the document below, including a Reference list. The document was returned to the author with various tracked changes to correct errors and clarify meaning.

TITLE: **Smallholder goat farmers' perceptions and willingness to participate in the agro processing industry: A case study of Mamaila Village, Greater Letaba Local Municipality, Limpopo Province**

AUTHOR : **Tshepiso Florence Matlala**

Note: The edited work described here may not be identical to that submitted. The authors, at their sole discretion, have the prerogative to accept, delete, or change amendments made by the editor before submission.

DATE: **7 December 2024**

EDITOR'S COMMENT

The author was advised to effect suggested corrections regarding subject-verb agreement, punctuation and overall academic writing style, to name a few.

Signature

Dr Kufakunesu Zano, PhD in English. A member of the South African Translators' Institute, Ref 1000686, South Africa 2024