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VALUE CHAIN ANALYSIS OF COMMERCIAL SMALLHOLDER PIG FARMERS IN GOROMONZI DISTRICT, ZIMBABWE

BY

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Abstract

The general objective of the study was to analyse the value chain of commercial smallholder pig production in Goromonzi district. The specific objectives of the study were to identify the key stakeholders, analyse respective marketing margins and determine the income distribution across the value chain, identify the determinants of quantity of pigs supplied to the market in the study area and the determinants of market outlets choice decisions of smallholder pig producers. The total sample for this study was sixty-seven participants drawn from all actors involved in commercial smallholder pig value chain. Purposive sampling was used to select commercial smallholder pig farmers and other actors in the value chain. Snowballing was also be used to create a network of key respondents. Multiple data collection tools were used including the survey questionnaire, key informant interviews, focus group discussions and observations. Key stakeholders in the smallholder pig production value chain, have been identified as the input suppliers, farmers, processors, wholesalers, retailers, consumers, and government departments such as Agricultural Technical Extension Services, and veterinary departments. A value chain was mapped, and the roles played by each actor were identified. Pork production is very capital intensive, across the value chain from primary production through to processing and the result is that significant economies of scale are required to produce profitably. Due to poor coordination within the chain most actors are not taking advantage of the benefits of aggregation but rather operate individually thereby reducing their margins especially the farmers. The study confirms farmers make the least return on investment when compared to eateries and abattoirs who have better market linkages as well as capacity to add value to make more income. The main factors affecting the performance of farmers include, high production costs, lack of adequate funding or formal contract farming, high disease prevalence, price volatility due to inflation and consumers' food safety concerns. Furthermore, primary producers have limited bargaining power with regards to prices even though they outnumber the wholesalers and retailers. The quantity supplied to markets is highly dependent on litter size, average mortality, and gender of a farmer. Farmers with high litter size and low mortality rate have more produce to supply to the market. Male pig producers also dominate the sector and as a result they supply more pigs to the market. Farmers in the district have an option to market their produce to wholesalers, retailers as well as consumers. Price satisfaction and method of payment where the main determinants of market outlet choice in the multivariate logit model. For the consumers in Goromonzi, price remained an important decision in choosing pork instead of other meats more than religion.

Key words: Value chain analysis, smallholder piggery

Declaration

I declare that this dissertation is my original work except where the sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

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Acknowledgments

Dedication

I dedicate this thesis to my late father, Charles Mushore, who inspired me to live a life with purpose.

List of Acronyms and Abbreviations

ADB   African Development Bank

AGRITEX   Agricultural Technical and Extension Services

FAO   Food and Agriculture Organisation of the United Nations

LPD   Livestock Production Department

MAMID   Ministry of Agriculture Mechanisation and Irrigation Development

NGO   Non- governmental Organisation

PIB   Pig Industry Board

UNIDO   United Nations Industrial Development Organisation

USAID   United States Agency for International Development

WFP   World Food Programme

ZAGP   Zimbabwe Agricultural Growth Programme

Definition of Key Terms

Value Chain - describes the sequence of related enterprises conducting activities to add value to a product from its primary production through its processing, marketing and final sale to the consumers Ahmed (2012).

Value Chain Analysis- seeks to assess and describe the stakeholders involved in the value chain and their financial performance Ahmed (2012)

Smallholder Farmers- the definition of smallholder farmer varies worldwide depending on location and intensification of farming systems. Smallholder farmers operate under 5 hectares of land with minimal resources and marketing opportunities (Technoserve, 2019). In the study, commercial smallholder farmer refers to farmers with 5 – 15 sow units.

Value addition- value addition is a process that involves transforming a primary product into a good that has additional value. This may include changing the current place, time and form characteristics to suite consumer tastes and preferences. These activities are generally undertaken by specialist market chain actors and services providers (Muluken, 2014)

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Zimbabwe has an agro-based economy with an estimated 60-70% of its national population depending on agriculture activities for livelihoods, the sector contributes 17% of the country's Gross Domestic Product, supplies 60% of raw materials to the agro-processing industries and provides 40% of the country's export earnings. Food and Agriculture Organisation of the United Nations FAO (2020). Agriculture provides employment to about one-third of the formal labour force Ministry of Agriculture Mechanisation and Irrigation Development MAMID, (2010). However, the performance of the sector has diminished in the past decade because of the countries' economic downturn, the fast-track land reform program and climate change among other factors.

1.2 Background to the Study

The livestock subsector is a key pillar in the agricultural industry with livestock and livestock products contributing 35-38% of the agricultural Gross Domestic Product (FAO, 2020). However, livestock value chains remain underdeveloped, and productivity continues to decline due to numerous constraints. The livestock subsector in Zimbabwe comprises of beef cattle, dairy, poultry, pigs, goats, and sheep. Smallholder farmers own most of the cattle (90%), goats (89%) and pigs (80%) as sources of animal protein, draught power, income, and social safety net during emergencies, especially drought (MAMID, 2010).

Pig production is increasingly becoming important since pork is the world's most consumed meat with 37% of the world's population consuming it followed by chicken (29%) and beef (24%), (McGlone, 2011). The sector has potential to generate the much-needed foreign currency and contribute significantly towards the Gross Domestic Product, which has declined drastically over the past years. Small-scale producers on estimate, make up 80% of the total pig production in Zimbabwe with the remainder 20% consisting of large-scale commercial producers (Mutambara, 2013).

Research by Mutambara (2013) on a preliminary review of regulatory constraints affecting pig in Zimbabwe showed that the smallholder pig producers were performing below standard. Table 1 below shows that the average litter size for a sow per farrowing is benchmarked at 12+ and the mortality rate is expected to be less than 3%. However, the results from the study show that the litter size for smallholder pig farmers is less than half of the average. The mortality rate is also much higher averaging at 10%. This is very poor performance compared to the set benchmark for the various traits. This poses the question; why is the performance of commercial smallholder pig producers so low? The question calls for research to study the pig industry value chain and identify the gaps and opportunities that exist within the value chain.

Table 1: Pig productivity in Zimbabwe

Traits	Benchmark	Farm Category			Average Weighted
		Small	Medium	Large	
Proportion (%)	-	28	29	43	-
Litter size	12+	6	9	11	9
Number of farrowing/yr.	2.24	2	2	2.24	2
Litter/year	27+	12	18	24.64	18
Farrowing rate (%)	88+	80	85	100	100
Growth rate in 5 months	100+	50	85	100	78
Dead weight feed conversion efficiency	3.5	4.3	4	3.8	4
Mortality rate (%)	3-	10	8	5	7
Age at 90 kgs (days)	150	270	159	135	188

Source: Mutambara (2013)

1.3 Statement of the Problem

The fast-track land reform program that was done from 2002 led to an increase in the number of commercial smallholder pig producers previously dominated by large scale commercial farmers (FAO, 2020). Since then, the performance of the sector has declined to the point where Zimbabwe now imports live swine from Malawi and South Africa, which the country formally exported to (ZimTrade 2016). The farmers are facing many constraints such as high production costs, low producer prices, limited financial resources, large number of middlemen in the marketing system and market information asymmetry among others. Moreover, the relationships between smallholder producers and key value chain players are weak resulting in stunted growth of the subsector.

1.4 Research Objectives

The overall objective of the study was to analyse the value chain of commercial smallholder pig production in Goromonzi district.

The specific objectives of the study are:

1. To identify the key stakeholders in the smallholder pig production value chain, their respective roles and to map the value chain of Goromonzi pig producers.

2. To analyse respective marketing margins and determine the income distribution across the value chain.

3. To identify the determinants of quantity of pigs supplied to the market in the study area.

4. To identify the determinants of market outlets choice decisions of smallholder pig producers.

1.5 Research Questions

1. Who are the key players and what are their respective roles along the commercial smallholder pig value chain in Goromonzi district?

2. What are the respective marketing costs and margins across the market channels?

3. What are the determinants of the quantity of pigs supplied to the market in Goromonzi district?

4. What are the determinants of market outlets choice decisions of smallholder pig producers?

1.6 Significance of the study

This study will be helpful firstly, in providing information to farmers of the various key stakeholders that they need to build or strengthen relationships with, for them to exchange value, reduce information asymmetry and exploitation by middlemen. Secondly, for Research and Development organisations, the government, and Non-governmental Organisations to formulate policy and development programs, which will help, improve operational efficiency of the smallholder pig value chain.

1.7 Delimitations of the study

The study focused on the value chain analysis of commercial smallholder pig production in Goromonzi district of Zimbabwe. The study was conducted during the 2021/19 season.

1.8 Limitations

The study is based on one-year data and is limited to one district which is Goromonzi district. Most farmers were sceptical about the intentions of the study particularly due to speculations of repossession of land by government of non-productive farms. This

was overcome by signing of consent forms of privacy and non-disclosure for both parties.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter explains various aspects of the value chain analysis in agricultural commodities. It starts with the history of the concept, its purpose and the components that make up the concept. It takes into consideration both theoretical and empirical contributions. It also explains the agricultural value chain, its importance and gives account of empirical studies that were done prior to this study.

2.11 Theoretical Framework

Transaction Cost Theory was first introduced by Coase in (1937) and was later popularized in (1965) by Oliver William (Tadelis & Williamson, 2010). The Transaction Cost Theory is based on the idea of a small number of actors contracting under conditions of imperfect and asymmetrically distributed information between the transaction parties. The level of transaction costs influences the decision to either perform a transaction internally (vertical integration of organisation) or through a market (horizontal integration or market). Internalisation of the transactions represent failure of the market to handle the transaction. The transaction cost theory is made up of two main assumptions with respect to human behaviour: bounded rationality and opportunism:

Bounded rationality- was a concept that was proposed by Simon (1982) which refers to the neurophysiological and language limits of individuals. Bounded rationality assets that human beings have constraints on their cognitive capabilities and limits on their rationality. Due to uncertainty in the agricultural value chain associated with demand and supply rational behaviour is limited. **Opportunism**- refers to the incomplete or distorted disclosure of information for the parties doing transaction. It is a subtle feature that is deeply rooted in human nature (2017) where actors in the

exchange relationship will be guided by considerations of self-interest with guile. Opportunism thrives in chains where information asymmetry dominates and in most cases the actors in the primary points are the most vulnerable.

The result of bounded rationality and opportunism is the risk of information asymmetry where parties may exploit their advantage in transactions. Both facets give rise to transaction costs through engaging parties such as government bodies to monitor behaviour to reduce unfair trade within parties. In the case of pigs, a buyer or seller may behave opportunistically towards the other parts, and this increases the cost of monitoring the transaction in terms of quality and price negotiation due to the absence of a complete contract.

2.2 Value Chain analysis

The value chain approach can be traced back to the 1960's '*filiere*' concept which focused on the analyses of value-added to a product from inception to conception, characterising stakeholders providing technical and economic functions, wealth creation and distribution along the chain. (Lancon, 2017). The term value chain was popularised by Michael Porter in the 1980's (Aguko, 2014) and his idea was to identify a firm's competitive advantage and disadvantages as a basis for developing competitive strategy either by cost advantage or differentiation advantage (Jurevicius, 2013). Therefore, a value chain analysis is a useful tool that can be used to improve efficiency and effectiveness of a firm.

2.3 Purpose of the Value Chain Analysis

Value chain analysis is conducted for a variety of reasons. The primary purpose of value chain analysis is to assess factors affecting competitiveness, the costs and

earnings of stakeholders in the value chain. (Ahmed, 2012). He further postulates that value chain analysis is used to identify gaps in performance, focus on distributional issues, pro-poor and gender-based growth as well as identification of levers targeted action programmes for improved performance within the chain.

2.4 Agricultural Value Chain

An agricultural value chain analysis identifies the set of actors (private, public, including services providers) and a set of activities that bring a basic agricultural product from production in the field to final consumption, where value is added at each stage (African Development Bank, 2014).

2.5 Components of an Agricultural Value Chain

An agricultural value chain identifies the set of actors (private, public including service providers) and the set of activities that bring a basic agricultural product from production in the fields to final consumption where at each stage value is added to the product (African Development Bank, 2013). According to Ahmed (2012) a value chain is made up of a series of stakeholders ranging from input suppliers, producers and processors to exporters and buyers, engaged in the activities required to bring a product from its conception to its end use. These stakeholders can be classified into six groups: input suppliers, primary producers, processing firms, services, and consumers. Analysing each individual element is crucial when conducting value chain analysis as well as value chain mapping.

2.5.1 Input supply

Input supply specialises in providing the inputs required to produce crops and livestock. The main inputs required for pig production are feed, water, breeding stock, labour, capital, housing, market, and knowledge (PIB, 2010). Agricultural input

suppliers are on responsible for delivering in accordance with farmers demand (Ranjan, R., et al (2013). However, due to various constraints and growing farmers demands the supply sector continues to fall short. Stakeholders at this stage can be individuals, corporate and government institutions. This stage involves a lot of research and development to produce seedstock.

2.5.2 Primary producers

Primary producers use the inputs supplied together with the natural endowments to produce raw materials or finished products such as meat, grains, and vegetables. Farmers occupy a key position in agricultural value chain and determine the sustainability of the chain. Actors at this stage can be family farms, farmer groups, cooperatives, smallholder farmers, medium or large-scale farmers. Primary producers often put in the most effort and usually get very little in return when compared to other stakeholders in the value chain. (Cox, 2009). Value addition is the means to farmers increasing their revenue, rejuvenate and stabilise their farm operations (Ranjan Roy et.al, 2013).

2.5.3 Processing

Processing involves transforming the product into different forms either as an ingredient for further processing or ready for consumption. Agro processors play an important role in value addition. The Southern African agricultural economy has little room for emerging farmer and there is no strong support system available for small farmers venturing into agro processing (Mthombeni, D.L., Antwi, M.A. & Oduniyi, O.S, 2022) They further postulates that participation of smallholder farmers in agro processing could relate to the rural poor economic development. Stakeholders at this stage can be small-scale, medium to multinational corporations.

2.5.4 Marketing and Distribution

This includes distribution of products to the places of demand through transporters, marketing agents/middlemen, wholesalers, contracting firms and others. Most smallholder farmers in most Sub-Saharan African have poor access to lucrative markets and this results in transaction costs, post-slaughter costs and reduces market efficiency (Kayonza, 2014). Chau et al (2017) argued that the middlemen are the first-person farmer consult to buy from there, this implies that farmers hand over themselves to exploitation by middlemen. Improving smallholder farmers' access to markets has become an essential element in strategies to promote rural development and poverty reduction (Sikwela *et al* 2016).

2.5.5 Services

Agricultural services providers play an important role in the overall performance of the value chain. Service providers include farm extension, financial institutions, marketing information, identification of end market among others. Smallholder farmers interact mostly with extension service providers (Lukuyu, B., et al, 2021). However, there is need to interact with all stakeholders to improve efficiency within the value chain.

2.5.6 Consumers

The consumer is the driving power of the entire chain with very little participation in the chain. Since the economic downturn, the demand for pork and pork products has by 20% (USAID, 2012). This pauses a serious problem for producers because consumer demands determine the entire production process by demanding a specific product in a specified quantity and quality.

2.6 Conceptual Framework

A value chain comprises of all stages of a technical production process as well as interactions between these stages. The input supply precedes the production process followed by processing, marketing and distribution to the consumer who finally consumes the product. The value chain is completed by interactions between the stages which is in the form of relationships and contractual agreements. These relationships determine the way goods are traded between the entire chains.

The conceptual framework of pig production is viewed as a network of horizontal and vertical linkages. The actors aim to provide produce for the market. The chain includes actors who are commercially involved as input suppliers, producers, traders, retailers, and consumers. There are also service providers and other institutions that support the functioning of the chain. These include financial and non-financial services providers such as banks, MFI's, transportation, extension agents, research institution, parastatals, the government, and NGO's. Figure 2.1 depicts the conceptual framework of the study which reflects the possible order of analysis of the pig value chain.
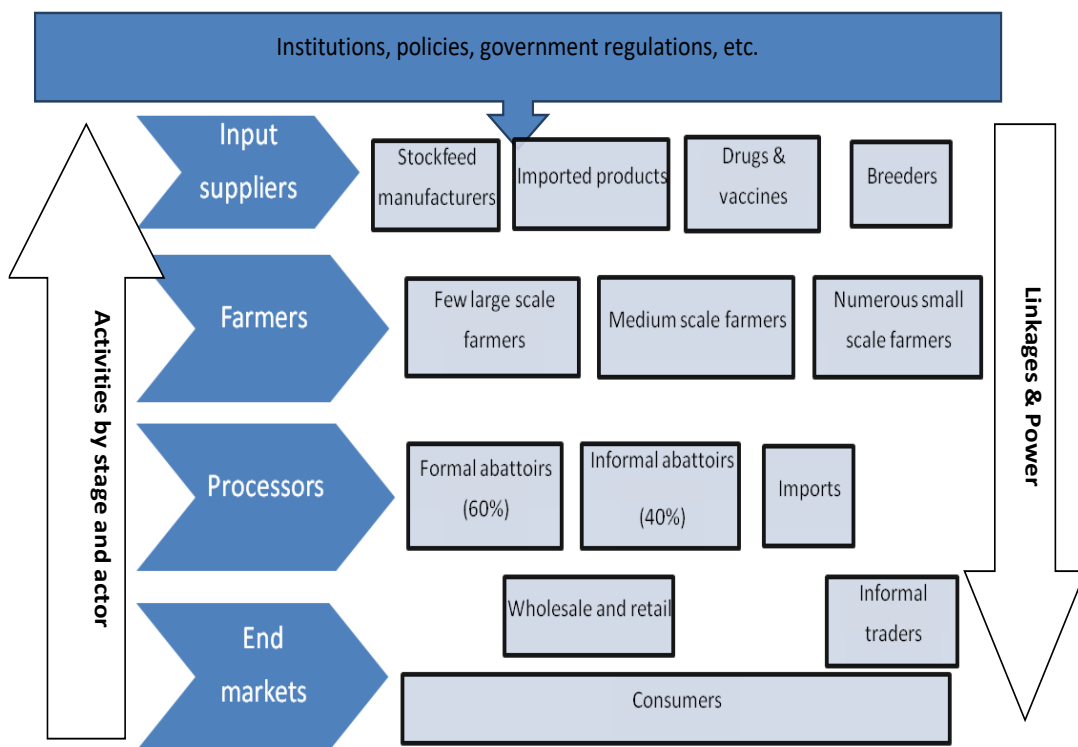
Figure 1: Pig value chain conceptual framework

Source: Own sketch

The identification of key stakeholders, roles, opportunities, and gaps is subject to the application of a conceptual framework. Conceptual frameworks also help to understand income distribution and marketing margins along the chain.

2.7 Value Chain Mapping

Value chain mapping is a process that identifies the sequence of activities, key actors and relationships involved in the value chain. Kuroiwa (2021) views value chain mapping as a visual representation of the connections between actors and tracing a product conception to inception. He further argues that the map also outlines international input-output data which encompasses objective information on the inter-

industry transactions of goods and services as well as primary input (value-added) and final output (final demand) transactions which merge within the whole value chain.

According to (UNIDO, 2009) value chain mapping is conducted in qualitative and quantitative terms presenting the various stakeholders of the chain together with their linkages and operations from preproduction to processing and distribution. Hellin & Meijer (2012) also posit that value chain mapping is done first with a qualitative study followed by a quantitative study when the map of the chain is completed. Value chains mapping uses mixed method research approach which strengthens the conclusions of the research.

2.8 Marketing margin

Marketing margin can be defined as the difference between prices at two market levels (FAO, 2011). According to Greener (2008), it is the percentage of the final weighted average selling price taken by each stage of the marketing chain. Marketing margin is an important index in the evaluation of value chain performance. As products move from one stage of the chain to the next, value is added, and this results in price differences.

However, Cox (2009) notes that primary producers are often amazed with the high marketing margins between farm gate price and the final price paid by the consumers. Holland (1998) argues that price is a function of the cost of production and a desired level of mark-up. According to Mandizvidza (2017) high marketing margins reflects the possibility of exploitation to either farmers and consumers or both.

2.9 Quantity Supplied to Market

Quantity supplied to market refers to the amount of product producers are willing to sell at a particular point in time (Government of Alberta, 2020). The quantity supplied is mainly affected by price, cost of production, technological factors, climate, and storage possibilities FAO (2020). Several studies have been done on determinants of quantity supplied to market using two staged least squares (2SLS). Examples include, (Wegi & Berhanu, 2017).

2SLS is an extension of the OLS method which is used when the dependent variables error terms are correlated with the independent variable(s). It involves using regression in two stages, in the first stage a new variable is created using instrument variable and in the second stage, the model-estimated values from stage one is then used in place of the actual values of the problematic predictors to compute OLS for the response of interest. This study employed overcome 2SLS which was specially designed to deal with endogeneity by using the estimates of first stage in the second stage.

2.10 Market Outlet Choice

Market outlet choice plays a fundamental role in determining farm household income. Farmers should make informed decisions as to where they sell their produce to maximise their benefits (Melese *et al*., 2017). According to Okello (2009) the consequences of information asymmetry are problems of moral hazard which result in decision making on market outlet choice very difficult. Farmers continue to have limited or no access to information that can improve their participation in the marketplace such as prices, quality, quantity, and timing. As a result, farmers have little or no bargaining power and end up selling at farm gate or in their local areas thereby fetching low profits.

Several studies have been done on the determinants of market outlet choice and the most commonly used are analytical approaches. These include binary probit or logit (Bongiwe, 2013), multinomial probit or logit mamo (Anteneh *et al*.,2011) while Melese *et al*., 2017 used the tobit approach. These empirical studies overlook the possibility of simultaneous choices of outlets. As a result, the study used multivariate logit model considering to simultaneously model the effect of explanatory variables on the market outlet choice alternatives.

The observed outcome of market outlet choice was modelled following the random utility formulation. The model aims at modelling the choice of market outlet among farmers from discrete set of alternatives which individuals are likely to choose a market where they derive the most benefits from.

2.12 Value Chain Governance

Governance is often viewed as the power that defines who and who does not participate in a chain, setting the rules of inclusion, assisting participants to achieve the standards set and monitoring their performance (Kaplinsky *et al*., 2002). The governance structure in any chain is key to determining the allocation of resources and gains and their flow within the chain. Value chain governance refers to the relationships among the buyers, sellers, service providers and regulatory institutions that influence the range of activities required to bring a product from inception to conception. Governance is about power and the ability to exert control along the chain. At each stage of the chain, an institution sets and/or enforces parameters under which actors in

the chain operate. The following questions are addressed; what is to be produced? How is it to be produced and when? (i.e., production scheduling and logistics).

The firm that sets parameters which actors in the firm must adhere to is referred to as the lead firm. Lead firms emerged because of two trends.

- Production differentiation strategies and concerns for meeting environmental and social rules and set standards by external agents,

- Vertical integration- outsourcing in-house

2.13 Empirical Studies

Several studies employed the value chain approach to agricultural commodities. Bezabih & Mengistu (2011) conducted a study on potato value chain analysis in Tigray and SNNP region which indicated that farmers produce for seed as well as consumption. The major actors include input (seed, fertiliser, fungicide, farm implements) suppliers, producers, wholesalers, brokers, retailers, and consumers. The potato value chain is constrained by perishability, shortage of improved and quality seed, low yield levels, poor irrigation and post-harvest handling infrastructure, poor disease control, low skills and processing technology and middlemen interference causing price distortions. Value chain analysis identifies strengths and weaknesses along the chain which helps improve the overall performance of the chain benefiting all stakeholders in the chain (UNIDO, 2009).

USAID (2011) conducted a value chain study on off-season vegetables in Nepal. The study revealed vast opportunities that the subsector can capitalise on for competitive advantage. These included availability of inputs, suitable climatic conditions, technical

support, increased demand, supportive trading policies (national, regional, and global) and attractive prices for off-season vegetables. Some identified challenges were lack of infrastructure such as irrigation and transportation, shortage of labour, poor storage facilities which result in postharvest losses and limited access to market information. It is interesting to note that most of the value chain studies reveal more challenges than opportunities. The study recommended short term and long-term infrastructural development to address the identified challenges.

Husain., *et al* (2013) conducted research on estimation of marketing margins in the supply chain of tobacco in Faisalabad District of Pakistan. The study concluded that there is a high presence of middlemen in the chain such that buying directly from the producers reduces prices of tobacco by 95 rupees per kilogram. However, Toure & Wang (2013) argue that traders do not always make large profits due to price fluctuations which are subject to demand and supply. A similar study by Kalule & Kyango (2013) used marketing margin analysis to measure market performance and efficiency of Banana retail trade Kampala, Uganda. They used primary data to compute marketing margins and concluded that transaction costs led to variations in the marketing margins.

Pandey et al., (2013) conducted a study on an economic study of marketed Surplus of chickpea in Rewa District of Madhya Pradesh using cross sectional data by adopted multiple regression. The studies came up with the finding that yield/ha, family size, production of chickpea, size of holding and income from other sources variables are significantly affected on marketed surplus. Adenuga *et al*, 2013 conducted a similar study on marketing efficiency and determinates of marketable surplus in vegetable production in Kwara state, Nigeria. The study showed that the marketable surplus was

found to be approximately 60% of the total vegetable production. Household size, spoilage at farm level, level of education of household head and farming experience were the significant determinants of marketable surplus in vegetable production of the study area.

Kuma (2014) conducted a study on factors affecting milk market participation and volume of supply in Ethiopia and adopted Heckman two-stage selection models. The study indicated that milk yield per day, dairy farming experiences and household size significantly affected volume of milk supply. Angrist., 1995 applied a two stage least squares (2SLS) regression model to analyse the determinants of marketable surplus of household malt barley. The study discovered that marketable supply of malt barley was significantly affected by output of malt barley, selling price, market information and distance to market.

Almaz *et al*., (2014) used value chain approach to study constraints of vegetables in Ethiopia in relation to gender. The findings of the study indicated that onion and tomato value chain face challenges such as low yield, poor production and marketing skills, poor quality of seed, to many middlemen hindering fairness of trade, poor road networks, poor storage and handling facilities, lack of market information, lack of capital and poor vegetable marketing policy. The study highlighted that female headed producers had low yield compared to their male-counterparts. The study recommended improved seed production, improved extension services to females headed producers to bring equitable and sustainable change in the value chain.

To date, a few studies have been done to investigate factors influencing marketing channel choice decisions. Riziki *et al*., (2015) conducted a study on determinants of

market choice outlets for African indigenous vegetables among the Agro-Pastoral Maasai of Narok and Kajiado of Kenya and adopted multi-nominal logistic regression model. The study indicated that agricultural market distance, education level, off farm income, level of value addition, household size and marketing costs are the main factors that influence choice of marketing outlet by the agro-pastoral. Farmers choose market outlets mainly based on convenience and economic profitability (Nyaupane & Gillespie, 2010).

Chalwe (2011) studied on smallholder bean producers and the factors that influence their choice of marketing channels in Zambia. He adopted a probit model and results from the model indicated that the choice of marketing channel was directly influenced by scale of operation, distance to market, price of beans, farmer's age, farming mechanization and livestock ownership. In a similar study, Mukiama *et al*., (2014) used a multinomial logistic regression to study factors influencing vegetable market outlets by farmers in KhonKaen, Thailand. Factors such as gender, income, experience, vegetable land size, and type of pesticide used were found to significantly affect the farmer's choices of marketing channels.

2.14 Identification of Gaps

The literature review showed that more emphasis is on crop production as far as value chain analysis is concerned. Very few researchers are interested in livestock value chains. The smallholder pork value chain in Zimbabwe is not well documented. This documentation is important if the right interventions are to be deployed.

2.15 Summary

The researcher noted that no similar research on commercial smallholder pig production has been done and that most researchers have a bias towards perishable crop value chains. Very little emphasis is made on livestock value chains.

CHAPTER 3 METHODOLOGY

3.1 Introduction

The purpose of this chapter is to present the philosophical assumptions underpinning this research, as well as to introduce the research methodology and the empirical techniques applied. The chapter also defines the scope and limitations of the research design.

3.2 Research design

The study followed a mixed methods approach and cross-sectional design. The target population of pig farmers, processors and traders were identified with the assistance of extension officers working in the district through purposive sampling and using the snowballing technique. Purposive sampling was used as only pig farmers, processors and traders were targeted for the study and snowballing technique was used to establish the pig network in the district. Quantitative research- In this study, emphasis was placed on numerical analysis as it is more reliable and objective. It also allows for replication of findings. However, its major limitation is the fact that it does not accommodate non-numerical data. Qualitative research - Qualitative data was used to analyse emerging themes. This type of research complements quantitative research and using the two approaches in this research provided a balanced output.

3.3 Population and sampling procedure

The population of commercial smallholder pig producers in Goromonzi district is 80. Purposive sampling was used to select commercial smallholder pig farmers and other actors in the value chain. Snowballing was also used to create a network of pig farmers. The sample size for this study was drawn using Yamane (1967) formula as follows.

n $= N/(1+Ne2)$

    $= 80/1+80(0.25)$

    $= \underline{67}$

Where n = sample size, N = population size and e = degree of variability considered at 5%. The required sample size was at 95% confidence level and 5% level of significance.

Table 2: Profile of questionnaire and Key informants

Questionnaires	Key informant interviews	Number
Farmers		57
	Agritex/LPD	1
	PIB	1
	Triple C	1
	Processors	2
	Retailers	2
	Consumers	2
	Financiers	2
Total		**67**

Table (2) above shows the profile of respondents for the study. 10 key informants were interviewed using purposive sampling and focus group discussions were conducted with representation from all actors.**3.4 Data Collection Instruments**

According to Acharya (2010) a questionnaire is a document containing list of structured questions that are chosen after a considerable testing with the aim of obtaining responses from a particular sample chosen by the researcher. Using a questionnaire can allow the researcher to collect large amounts of information which can be analysed scientifically and objectively. However, a questionnaire may lack validity or reliability and to overcome this problem a researcher can pre-test the questionnaire and compare it against secondary data. Section A collected demographic data for the researcher to gain general knowledge on the farmer. Section B contained technical data which showed the technical issues on production. Section C contained data on the cost of production at farm level. Section D contained marketing data and Section E contained information on financing. Both secondary and primary sources of data were used for this study.

3.4.1 Secondary Data

Secondary data sources included bulletins, published and unpublished reports, websites, and annual reports from PIB, LPD, ZIMASSET, FAO, WFP and Ministry of Agriculture, Mechanisation, and Irrigation Department. Both qualitative and quantitative data were collected and used for the study.

3.4.2 Primary data

Primary data was collected from input suppliers, farmers, processors, wholesalers, retailers, and consumers. Primary data was collected using focus group discussions, key informant interviews and a self-administered questionnaire. A pilot study was conducted to pre-test the effectiveness of the structured questionnaire and to determine

the reliability and validity of the explorative questions. A questionnaire was administered to 57 pig farmers in Goromonzi district, 10 Key informants were interviewed form PIB, AGRITEX and Triple C and 4 Focus Group Discussions were conducted, and the total number of participants was 25.

3.5 Analysis and Organisation of Data

The study used descriptive statistics, value chain analysis, marketing margin analysis, thematic analysis, and econometric analysis.

3.5.1 Descriptive analysis

Descriptive statistics such as frequency, mean, percentage, and standard deviation were used. Tables, pie charts and bar graphs were also used present data.

3.5.2 Value chain analysis

Value chain analysis is a tool that is used to break a chain into single components to understand its structure and functioning. The analysis was used to identify actors in the chain, relationships, responsibilities, value addition, costs, and income distribution. Information was obtained by conducting interviews, focus group discussions and collection of secondary data. This provided the information required for mapping the commercial smallholder pig value chain.

3.5.3 Marketing margin analysis

Marketing margin analysis was used to describe price differences between two points in the marketing chain. In this study, marketing margin was derived from data on buying and selling prices at all points of the value chain. The formula is given as follows:

$$TGMM = \frac{End\ buyer\ price - First\ seller\ price}{End\ buyer\ price} \ x\ 100$$

(1)

Where:

TGMM = Total gross market margin

Price transmission

Price transmission was used to assess the income distribution of the different actors in the value chain. The following equations was used to calculate price transmission at each stage:

Producer's share equation.

$$PS = \frac{PX[1-(\frac{MMf}{Rp}\ X\ 100]}{\frac{RP}{S}}$$

(2)

Where:

PS = producer's share, PX= producer's price, Rp= retail price, MM$_f$= Market Margin of farmers, S= sum of average share (throughout)

Processor's share equation.

$$PRS = \frac{PRX \left[1 - \left(\frac{MMpr}{Rp} \times 100\right)\right]}{Rp/s}$$

(3)

Where:

PRS=Processor's share, PRX=Processor's price, Rp=Retail price, MMpr=Market Margin of processors, S=sum of average share (throughout)

Trader's share equation.

$$TS = \frac{TX}{\frac{Rp}{s}} = \frac{\left[1 - \left(\frac{MMt \times 100}{Rp}\right)\right.}{5}$$

(4)

Where:

TS=traders share, TX=trader's price, Rp=retail price, MMt= Market Margin of traders, S=sum of average share (throughout)

3.5.4 Thematic Analysis

This study used thematic analysis to analyse qualitative data. It provides a structured methodology for identifying emerging themes within a data set and is not constrained by one epistemological position (Boyatzis, 1998). An inductive thematic analysis of semantic information from interview transcripts was used. According to Braun & Clarke (2006) thematic analysis develops bottom-up themes, which are open to participant's experiences rather than seeking views on topics informed by the evidence base. This helps to avoid assumptions and biases in the literature being perpetuated

Braun & Clarke (2006) and limits the influence of the researcher's pre-existing belief. However, there is no clear agreement about what thematic analysis is and how you go about doing it (Boyatzis, 1998).

3.5.5 Econometric analysis

Econometric analysis was used to identify the determinants of quantity of pigs supplied to market and of decisions of farmers' choice in market outlet. Two-stage least square regressions (2SLS) model and multivariate probit model was used.

Determinants of market supply

This study employed 2SLS to determine quantity supplied to the market. The Econometric model specification of supply function in matrix notation is as follows:

$$Y = \beta_0 + X_k'\beta_1 + \eth Y_1 + U$$

$$(5)$$

where, Y is vector of number of pigs supplied to the market, X_k is the exogenous variable that is assumed to affect market supply of pigs, Y_1 is a vector of endogenous variables which are productivity of pigs, β_0, β_1 and $\eth$ are a vector of parameters to be estimated and U is a vector of disturbance or error term

Determinants of market outlet choice

Multivariate logit model was used to establish the determinants of market outlet choice. Consider the ith farm household (i=1, 2 ……………. N), facing a decision on which market outlet to choose from the available alternatives. Let U_0 represent the benefits of the farmer who chooses wholesalers and let U_k represent the benefit of the

farmer who chooses the Kth market outlet: where K denotes choice of wholesalers (Y_1),

retailers (Y_2) and consumers (Y_3). The farmer decides to choose the Kth market outlet

if $Y^*_{ik} = U^*_k - U_0 > 0$. The net benefit ($Y_{ik}$) that the farmer derives from choosing the

market outlet is a latent variable determined by the observed explanatory variable (X_1)

and the error term (ϵ_i):

$$Y^*_{ik} = X_i \beta_k + \epsilon_1 \qquad (k = Y_1, Y_2, Y_3)$$

$$(6)$$

Using the indicator function, the unobserved preferences in equation (6) translates to

the observed binary outcome equation for each choice as follows.

$Y_{ik} = 1$ if $Y^*ik > 0$ $\qquad\qquad (K = Y_1, Y_2, Y_3)$

0 Otherwise $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (7)$

In multivariate, where the choice of several market outlets is possible, the error terms

jointly follow a normal distribution with zero conditional mean and variance

normalised to unity (for identification of the parameters) where (μ_{y1}, μ_{y2}, μ_{y3})

MVN ~ (0, Ω) and the symmetric covariance matrix Ω is given by:

$$\Omega = \begin{bmatrix} 1 & P_{y1y2} & P_{y1y3} \\ P_{y2y1} & 1 & P_{y2y3} \\ P_{y3y1} & P_{y3y2} & 1 \end{bmatrix} \qquad (8)$$

$$\qquad\qquad P_{y4y1} \quad P_{y4y2} \quad P_{y4y3}$$

Where:

P_{ij} = represents the correlation between different market outlets. The off-diagonal

elements in the covariance matrix represent the unobserved correlation between the

stochastic components of the different type of outlets. The assumption means that

equation (8) generates a multivariate logit model that jointly represents decision to choosing a particular market. The specification with the non-zero off-diagonal elements allows for correlation across error terms of several latent equations which represents unobserved characteristics that affect the farmers' market choice from the alternatives.

3.5.6 Definition of Variables

This study used two-stage least square (2SLS) and multivariate logit to identify factors influencing quantity supplied and market outlet choice respectively. The dependant variables were Quantity Supplied to Market (QNTSUP) and Market Outlet Choice (MKTCH). The study hypothesised both continuous and discrete variables which were expected to influence the dependent variables.

3.5.6.1 Dependent Variables

Quantity Supplied to Market (QNTSUP) – a discrete variable for measuring the number of pigs supplied to the market. Market outlet choice (MKTCH) - a categorical variable which measures probability of farmer's market outlet choice. The categories included wholesalers (Y_1), retailers (Y_2) and consumers (Y_3).

3.5.6.2 Independent Variables

Litter size- this discrete variable tells the average number of offspring of sows. Sows may give birth twice in a year with an average of 10 piglets. Litter size contributes to determining the number of pigs a farmer can sale to the market.

Average mortality- this discrete variable negatively affects number of pigs to be sold by a farmer. It is inevitable that some pigs or piglets die but the number should be kept at a minimum, ideally not more than 3% otherwise the quantity to be supplied will be adversely affected.

Experience of Farmer (FamExp)-this is a discrete variable measured in number of years the farmer has been in the pig industry. A farmer with more experience is assumed to supply more produce to the market as well as change market outlet due to varied experiences over time. Berhanu., *et al* (2013) discovered a positive relationship between dairy farming and experience and market choice, thus, experience is assumed to affect market outlet choice.

Gender of Farmer – this is adummy variable for gender of farmer (1=male, 0=female). Empirical studies have shown that gender can have either negative or positive influence on both market outlet choice and quantity supplied to market. Males have been reported to search for more market alternatives than women.

Sale often- this is a continuous variable used to measure how often a pig farmer goes to market their produce per annum.

Transport – this is a dummy variable used to indicate whether farmer has own transport or not to transport their pigs to the marketplace.

Market Information- this is a dummy variable for access to information (Access=1, No Access= 0)

Market Access – this is a continuous variable measured in kilometres from the farm to the nearest market. Holloway *et al*., (2000) stipulated that, farmers who live close to markets tend to participate better and supply livestock produce when compared to those who live far from markets. In this study, the influence of distance on quantity supplied and market outlet choice was hypothesized.

Method of payment – this is a continuous variable which measures the method of payment options for farmers (Bond note=1, Transfer (bank and mobile) =2, USD=3). All forms of payments are accepted except for batter trade only and payments are made continuously and quantitatively.

Price Satisfaction- this is a continuous variable measured as average price, Price per kilogram. It follows that farmers tend to choose markets where they derive the most benefits. Price can influence farmer's market choice as well as quantity supplied to a particular market.

3.6 Ethical Considerations

Kothari, (2004) highlights that in collecting data for the research there is need to observe issues that relate to research ethics. According to Greener (2008) research ethical issues are factors that researchers should consider in the fair and reasonable treatment of participants, including respect, competence, responsibility and integrity.

This research was carried out in an honest and objective manner, upholding the ethos of integrity, competence, carefulness, openness, respect for intellectual property and

confidentiality. Greener (2008) highlights that the following key ethical issues arise in carrying out a research project and these were respected in this research: the researcher sought informed consent from the participants by explicitly and honestly giving a full brief to participants explaining the purpose of the research; the privacy of possible and actual participants was ensured by using pseudonyms or codes rather than actual names; official channels were used to seek permission to carry out this study as well as ensuring that the participants give their consent to be part of the research; the researcher ensured that there was confidentiality of information provided by individuals or identifiable participants and their anonymity was maintained. This was ensured by using pseudonyms rather than the actual names of participants. Finally, the researcher avoided deception by faithfully stating the purpose of the research, its promises of anonymity and confidentiality.

3.7 Validity and reliability

3.7.1 Validity

Validity is a compulsory requirement for all types of studies (Lobiondo-Wood., *et al* 2013). Validity of research can be defined as the extent to which requirements of scientific research method have been followed during the process of generating research findings. The main types of validity are content validity, criterion-related validity, construct validity, internal validity, external validity, concurrent validity, and face validity (Cohen *et al*., 2007). In this study the researcher ensured validity by selecting the correct and suitable sampling method for the study. Purposive sampling was used to selected commercial smallholder pig producers and the respective key stakeholders along the chain. Snowballing was also used to establish the network of all players in the district because they know each other. The appropriate methodology

was selected and ethical considerations such as informed consent and honesty were also upheld.

3.7.2 Reliability

Reliability refers to the extent to which consistent answers can be obtained using the same instruments more than one time. Thus, if research is associated with high levels of reliability, it follows that other researchers should generate the same results using the same research methods under similar conditions. According to (Babbie, 2010) reliability is a concern each time one observer is the source of data, because there will not certainly guard against the impact of the observer's subjectivity.

Reliability is closely with subjectivity and once a researcher adopts a subjective approach in the study it implies that the level of reliability is compromised (Oliver, 2010). Although the threats to research reliability and validity cannot be eliminated, the researchers strived to minimize this threat as much as possible by taking all the necessary measures to ensure validity and reliability.

3.8 Study area

The research was conducted in Goromonzi district which is in Mashonaland East province of Zimbabwe. The area is in Natural Region II which receives mean annual rainfall of 600-1000mm and mean temperature of 29^0C. The study targeted commercial smallholder pig farmers. Goromonzi district was selected because most pig producers are concentrated in the area due to climatic conditions which favour piggery production. The Pig Industry Board (PIB) research station which offers central breed testing and certification, training and extension is also located in the region

which makes it easy for locals to venture into pig production. The climatic conditions

of the study area are also suitable for feed crop production such as maize and soyabean.
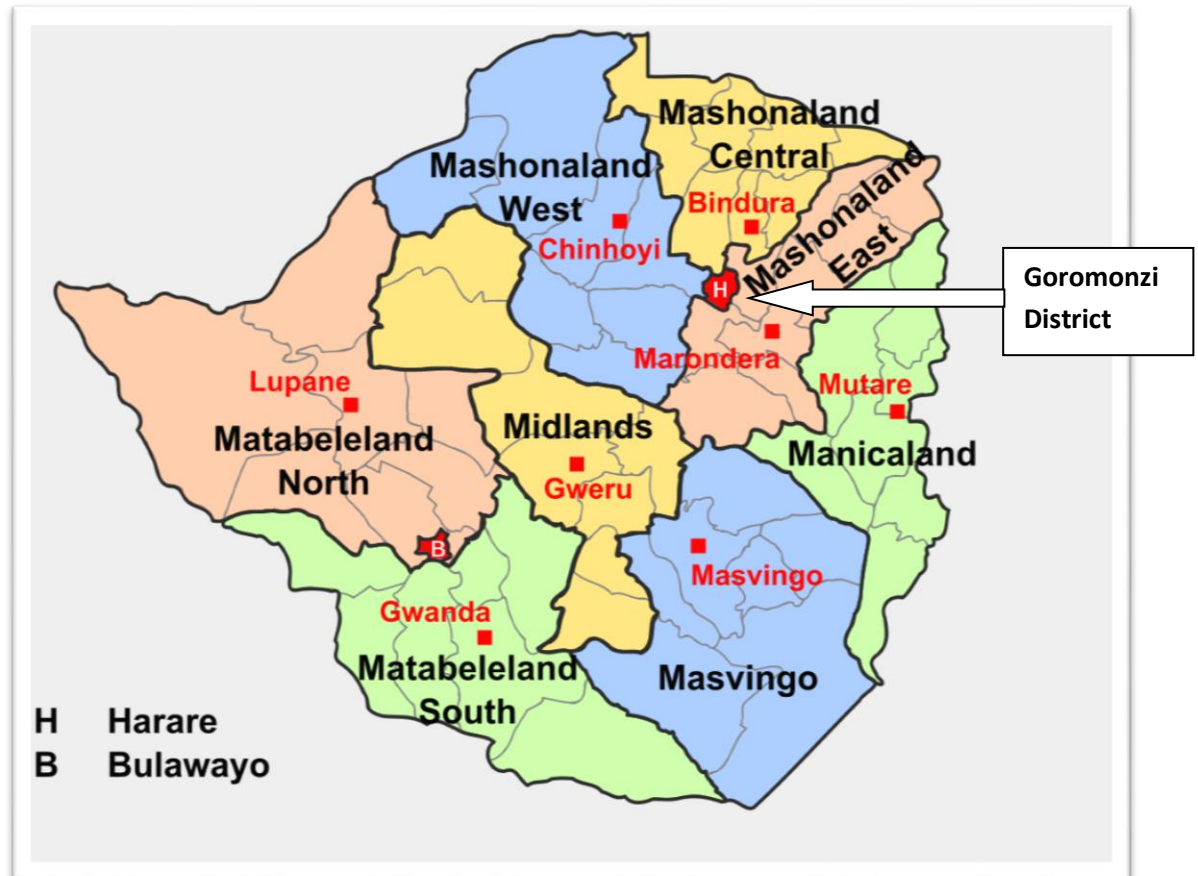
Figure 2: Goromonzi District, Zimbabwe   Source: Google Maps

Further, proximity to the capital city, Harare also provides a better platform for the

smallholder farmers to explore rural-urban connections to have access to new

agricultural innovations. The district enjoys and absorbs the effects of urban

development

3.9 Research approach

This study assumed the abductive approach as the objective is to analyse the pattern or flows of goods, resources, and information in the commercial smallholder pig value chain.

3.12 Analytical Framework

Table 3: Analytical Framework

SPECIFIC OBJECTIVES	RESEARCH QUESTIONS	ANALYTICAL APPROACH	TOOLS AND OR DATA REQUIREMENTS
To identify the key stakeholders in the smallholder pig production value chain, their respective roles and to map the value chain of Goromonzi.	Who are the key players and what are their respective roles along the commercial smallholder pig value chain in Goromonzi district?	Descriptive statistics, Value chain analysis	Questionnaire, Key informant Interviews, Focus group discussions

To analyse **respective marketing margins and determine the income distribution across the value chain.**	What are the respective marketing costs and margins across the market channels?	Descriptive statistics, Marketing margin analysis, Price transmission	Questionnaires, Focus Group Discussion, Key informant interviews
To identify the determinants of quantity of pigs supplied to the market in the study area.	What are the determinants of the quantity of pigs supplied to the market in Goromonzi district?	Multiple linear regression model, two-stage least square (2SLS)	Questionnaires, Key informant interviews, Factors of production, yields, prices
To identify the determinants of market outlets choice decisions of smallholder pig producers.	What are the determinants of market outlets choice decisions of smallholder pig producers?	Multivariate logit	Questionnaire, Key informant interviews

3.11 Methodological Limitations

Data was collected from individuals and there was possibility of bias and misrepresentation of data where records maybe missing. Triangulation was done to ensure data was as close to the truth as possible.

3.12 Summary

This chapter has presented and discussed the methodology that was used in this research. The chapter discussed the research design and the research philosophy that guided the study. The research population, sampling, data collection and analysis were also discussed. Finally, the chapter discussed the analytical framework and methodological limitations.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter looks at the presentation, analysis and interpretations on the results obtained from the study.

4.2 Data Presentation and Analysis

4.2.1 Socio-demographic characteristics of respondents

Socio-economic characteristics play a fundamental role in determining the levels of farm productivity (Mwanza *et al*., 2014). Mwaniki, (2006) notes that "boosting agricultural production capacity of farmers requires adequate information of their socio-economic characteristic as part of the strategy". The table below summarises the findings on socio-economic characteristics of respondents from the study.

Table 4: Summary of sociodemographic characteristics

Variable		
Gender	Male	79
	Female	21
Age of respondents	21-35	46
	36-45	42
	46-65	9
	65+	3
Level of Education	None	13.3

	Primary	20
	Secondary	40
	Tertiary	26.7
Marital Status	Married	52.2
	Single	22.4
	Widowed	10.4
	Divorced	15
Religion	Christianity	76.1
	African Tradition Religion	16.4
	Other	7.4
Land ownership	Communal	17
	Resettled	23
	Small-scale	26
Land size	Minimum	3ha
	Maximum	12ha

4.2.2 Pig value chain map in Goromonzi District

The pork value chain in Goromonzi district, can be said to be linear, from producers to consumers. Figure (10) below shows that there are multiple value chains which include Farmer-consumers, Farmer-butchery – consumers, Farmer-abattoir – consumers, Farmer – abattoir – butcher –consumers and Farmer-

abattoir- supermarket- consumers. The Figure below shows diagrammatic presentation of the pork value chain map in Goromonzi District;
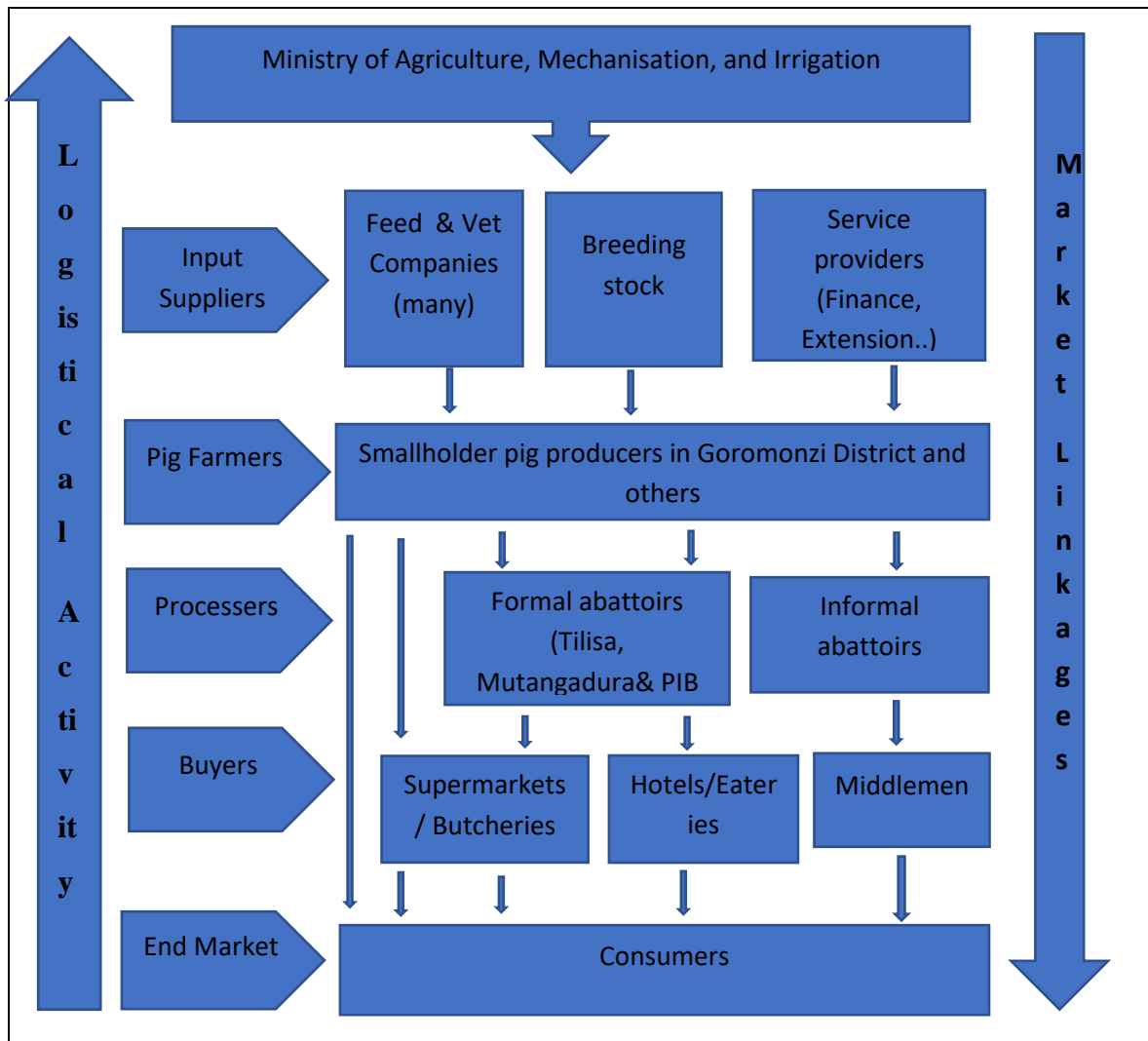
Figure 3: Pig value chain in Goromonzi

4.2.3 Marketing margins and income distribution across the pig value chain

The figure (16) below shows the results on income distribution across the pig value chain in Goromonzi district. Farmers receive 16% of the income, Abattoir's account for 22% of

the income, Butcheries receive 17%, Supermarkets 19%, and Eateries have 26% share making them the biggest earner.

<figure>

Farmer [16%, Share of Value added (SVA)]
(US$/kg) porkers (3)

↓

Abattoirs [SVA, 22%]
(US$/kg): wholesale (3); retail (4); viscera (1); pork cuts (3.5)

↓

Butcheries [SVA, 17%]
(US$/kg): pork loin (2.8); pork head (1.2); porkers (3.1)

↓

Supermarkets [SVA, 19%]
(US$/kg): pork trotter (3.3); pork cut-special (3.95); pork belly (4.21); pork loin (7.2); sausage country style (10); pork shoulder (4.21)

↓

Eateries [SVA, 26%]
Stewed pork (10-12.5)

Exchange rate: Zimbabwe Interbank US$: RTGS$ (1:100) for price

</figure>

Figure 4: Prices and income distribution along the pork value chain

4.2.4 Quantity Supplied to Market

Using the method of two staged least squares, litter size (litter), average mortality (mortality), gender of farmers (gender), experience of farmer (farmexp), number of times a farmer goes to market to sell pigs(saleoften), access to market information (mktinf) and having own transport (transpo) were the explanatory variables to the number of pigs sold to the market which is the dependent variable, and the following results were obtained.

Table 5: Two stage least square results for R

Multiple R	.921
R Square	.849
Adjusted R Square	.830
Std. Error of the Estimate	.614

Multiple **R** ranges from 0% to 100% telling the strength of relationship between independent variables and the dependent variable which in this case is number of pigs to be sold by a farmer and it is a whooping over 90%. Coefficient of determination (**R** square) is telling the proportion of variation of number of pigs sold by a farmer which is explained by all the independent variables in the model, and it is over 80%. **Adjusted R square** is a more reliable measure of the predictor power when compared to **R** square since it takes into consideration the sample size, or the number of variables included in the model. It is again the impressive over 80% so the model is a very good one.

Table 6: Two stage least squares for F

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	116.672	7	16.667	44.230	.000
Residual	20.726	55	.377		
Total	137.398	62			

The probability that results occurred randomly is extremely low here and the F value is way above one saying that this regression model has explanatory power or is significant and results did not happen by chance.

Table 7: Two stage least squares for litter size (litter), average mortality (mortality) and gender of a farmer (gender).

	Coefficient	Std. Error	Beta	T	Sig.
B_0	.655	1.250		.524	.603
Litter	1.523	.171	1.298	8.907	.000
Mortality	-.474	.166	-.280	-2.848	.006
Gender	-.627	.266	-.152	-2.360	.022
Farmexp	.249	.204	.095	1.222	.227

Saleoften	-1.383	.763	-.290	-1.811	.076
Transpo	-.276	.245	-.082	-1.126	.265
Mktinf	.388	.245	.112	1.583	.119

At 95% confidence level litter size (litter), average mortality (mortality) and gender of a farmer (gender) are significant determinants of number of pigs to be supplied by a farmer. It is therefore important for farmers to increase their sow unit being mindful of the boar to sow ratio which ideally should be 1:5 to increase their litter size. Results are showing that if litter size increase by one piglet there is an addition of one pig to be sold but average mortality being a negative contributor is showing that per every pig or piglet that dies there is a drop by almost 0,50 of sales. The significance of average mortality calls for farmers to make sure they timeously acquire the chemicals and drugs to prevent and cure diseases and other adverse conditions that causes mortality. Farmers may also need to give appropriate type and amount of food to pigs to make sure they keep safe until they sale. Results are showing a great significance of gender effect with female farmer supplying less than 30% of what is supplied by the male counter parts. Surprisingly experience is of no significance together with having own means of transporting pigs to the market. This maybe because experienced farmers are not increasing their sow unit to improve their litter size and again, they seem to be struggling to buy chemicals and drugs to reduce mortality rate which will then adversely affect them. Having own transport may have no significance because there are rural collectors in the area and wholesalers and retailers as well as consumers might be using their own transport to collect pigs from farmers. Frequency of selling and access to market information have weak significance and this

might be because farmers with larger herds might be selling less often compared to those with very small herds who might be frequenting the market to sell one or two pigs while those without detailed market information are resorting to serving rural collectors and local consumers.

Table 8: Two stage least squares result for experience factor (farm exp) and the sales frequency (sale often) for farmers.

	Litter	Mortality	Gender	Farm Exp	Sale Often	Transport	Mkt Inf
Litter	1.000	-.666	-.358	.174	-.861	-.230	.310
Mortality	-.666	1.000	.340	-.024	.485	.212	-.255
Gender	-.358	.340	1.000	.129	.189	.273	-.281
Farm Exp	.174	-.024	.129	1.000	-.259	-.130	-.064
Sale Often	-.861	.485	.189	-.259	1.000	.294	-.173
Transport	-.230	.212	.273	-.130	.294	1.000	-.482
Mkt Info	.310	-.255	-.281	-.064	-.173	-.482	1.000

Earlier the experience factor (farm exp) and the frequency (sale often) were surprisingly considered less significant, this might be due to multicollinearity as envisaged by some independent variables being highly correlated, for example litter size and frequency of

selling (sale often). Multicollinearities have a propensity of inflating probabilities resulting in significant variables being rendered insignificant.

4.2.4 Market Outlet Choice

Table 9: Multivariate Logit Findings for Market Outlet Choice

	(1)	(2)	(3)
VARIABLES	Wholesale	Retail	Consumer
Mkt access	-1.357	Base	-1.360
	(0.856)		(0.965)
price satisfaction	0.201***		1.227**
	(0.095)		(0.579)
Mkt inf	-0.425		-1.124
	(0.847)		(0.884)
2.method_of_payment	-2.349**		-1.114
	(1.105)		(1.217)
3.method_of_payment	-0.727		0.263
	(1.436)		(1.633)
Gender	-0.186		-0.373
	(0.958)		(1.073)
2.farmexp	0.799		1.429
	(1.251)		(1.298)

3.farmexp	1.022		0.671
	(1.336)		(1.507)
Constant	1.878		0.518
	(1.797)		(1.883)
Observations	67	67	67

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The findings show that farmer's choice of a market is positively associated with price satisfaction and method of payment. The multinomial logit results reveal that cash in bond or in USD is more preferred to transfers. For instance, on one hand, cash payment in Bond decreases the farmer's odds ratio of selecting wholesalers and consumers relative to retailers as market options. On the other hand, price satisfaction increases the farmer's odds ratio of selecting wholesalers and consumers relative to retailers. The main implication of the findings is that farmers prefer selling to retailers if the method of payment is cash and may prefer to sell to wholesalers and consumers relative to retailers if they are satisfied with prices.

Table 9: Akaike's information criterion and Bayesian information criterion

Model	Obs	11 (null)	11 (model)	Df	AIC	BIC
-	67	-90.49048	-76.43966	27	206.8793	266.406

Note: N= Obs used in calculating BIC: see [R] BIC note

The model properly fits the data as supported by the relatively smaller values of AIC and BIC as shown in table 4.12.

4.3 Discussion and Interpretation

4.3.1 Sociodemographic Factors

4.3.2 Gender of respondents

The results from the study indicated a gender imbalance with 79% of the pig farmers being male 79% while only 21% were female as shown on the chart below. This situation is capable of demoralising female participation in the sector (Ngeywo *et al*., 2015). According to FAO (2011), agriculture is underperforming in part because women who represent a crucial resource in agriculture and the rural economy as farmers, labourers and entrepreneurs face severe constraints than men in access to productive resources. Onumah & Acquah (2010) and others have concluded male farmers are likely to obtain higher output than women from employment of the same factors of production. This may be due to several factors such as inability to attend extension duties due to multiple gender roles, lack of access to credit facilities due to lack of collateral and general side lining in social participation. To bridge this gap, the Zimbabwe Agricultural Growth Programme (ZAPG)

is currently promoting female entrepreneurs in the pork industry to promote participation of women in the sector although more initiatives should be done.

4.3.3 Marital status of respondents

The results show that 52.2% of the respondents were married, 22.4% were single,10.4% were widowed and 15% were divorced. According to University of Nebraska (2010), the composition and size of farming family affects the level of production and productivity. Married farmers are likely to produce more than single headed homes. This may be due to the need to feed and sustain the family. The availability of farm labour can also be an incentive to produce more.

4.3.4 Religion of respondents

The survey shows that 76.1% of the respondents belong to the Christian faith, 16.4% belong to the African Tradition religion while 7.4% belong to the other category.

Goromonzi district is generally a Christian dominated area and pig consumption is generally high. However, during a key informant interview it was noted that farmers are sceptical to market their produce outside the district due to fear of facing religious constraints.

4.3.5 Level of education

The study showed that 13.3% of the respondents were illiterate with 20% and 40% of the respondents attained primary and secondary education respectively while 26.7 % obtained tertiary qualification and higher. This will ultimately improve household income and food security, all things being equal. Most pig producers in the study area are literate and can master trainings on general pig husbandry and other important topics.

4.3.6 Age of respondents

Many of the respondents are between the ages of 21-35 with 46%, 42% are in the age range of 36-45, 9% are in the age range of 46-65 and only 3% were over 65. This shows that most of the producers are youths and fall under the economically active category. Age is a key factor in profitability and productivity of the farmer (Ngeywo *et al*., 2015). Youths tend to be more energetic, adjust faster and adopt new technologies thus may be more productive than the elderly who may be more conservative. Most of the pig farmers fall under the youth category, and this shows immense potential to improve efficiency in the sector if adequate support is availed to the farmers.

4.3.7 Land ownership

Access to secure land tenure is important in pig production due to the need to erect permanent structures such as housing, storage facilities and biogas facilities in some cases. From the study sample, communal farmers constituted 17%, resettled farmers were 23% while small-scale were the highest with 26% of the pig producers. The average farm size is 5.72 hectares which support the notion that pig production does not require significant large size of land. Land tenure system, following the fast-track land reform programme post 2000, has resulted in insecure tenure for beneficiaries and cannot use land as collateral when applying for loans.

4.4 Value Chain Analysis of Commercial Smallholder Pig Farmers in Goromonzi district

USAID (2010) reported that there are currently three pork value chains responsible for the supply of pork consumed in Zimbabwe. These value chains comprise of input supply, producers, feed manufacturers, abattoirs, processing wholesalers, retailers, and consumers.

4.4.1 Input Suppliers

The main inputs required for pig production are feed, water, breeding stock, labour, capital, housing, market, and knowledge (PIB, 2010) and these are discussed in the following sections. There are other inputs and services that may not be easy to show on the map above although they are vitality important.

4.4.2 Feed and Drugs

Feed is a major cost driver in pig production contributing up to 80% of production cost. Most of the pig producers use commercial feeds. The noted suppliers were Farm and City, Feedmix, Profeeds, National Foods and Fivet. As shown in Table 4.4. Fivet® and Farm and City® are more popular because they supply the major inputs under the same roof, one stop shop, which are very convenient to pig producers. There are many feed and drugs suppliers hence farmers can choose one with competitive prices.

Table 10: Suppliers of feed and drugs

Supplier	Percent
Farm Formulation	6.7

	Farm and city	13.3
	Feedmix, Fivet	6.7
	National Foods	6.7
	National Foods, Fivet	6.7
	Profeeds, Fivet	60.0
	Total	**100.0**

Pig producers participating in FGDs noted that they sometimes cannot afford to meet up with the standards such as feeding a sow with 2kgs per day. They reduce quantity of feeds to save costs but that also affects the quality of our meat and *"we end up getting lower prices at the market"* noted one participant. On farm feed formulation is a strategy used by some farmers to reduce feed costs. During the focus group discussion, it emerged that farmers generally lack capacities to develop nutritionally balanced least-cost rations or did not have all the required ingredients. Therefore, to cut feed costs, swill feeding, that is feeding pigs on kitchen leftovers from restaurants and schools was practiced by some farmers.

4.4.3 Breeding Stock

The majority of the farmers keep exotic breeed with large white being the most common at 60%, Landrace 15%, Duroc 10% and Crossbreeds at 15% as shown in Fig 8 below. Crossbreeds combine good attributes from the different exotic breeds to harness good traits to improve productivity and quality of their output. During a focus group discussion, it was noted that the major suppliers of quality high breeding stock are PIB and Tripple C

although most farmers source their breeding stock from other farmers who are cheaper and sometimes offer payment terms. Figure 8 below shows the distribution of the pig breeds prevalent in Goromonzi district.

PIG BREEDS

Large White   Landrace   Duroc   Crosbreeds

15%
10%
15%
60%
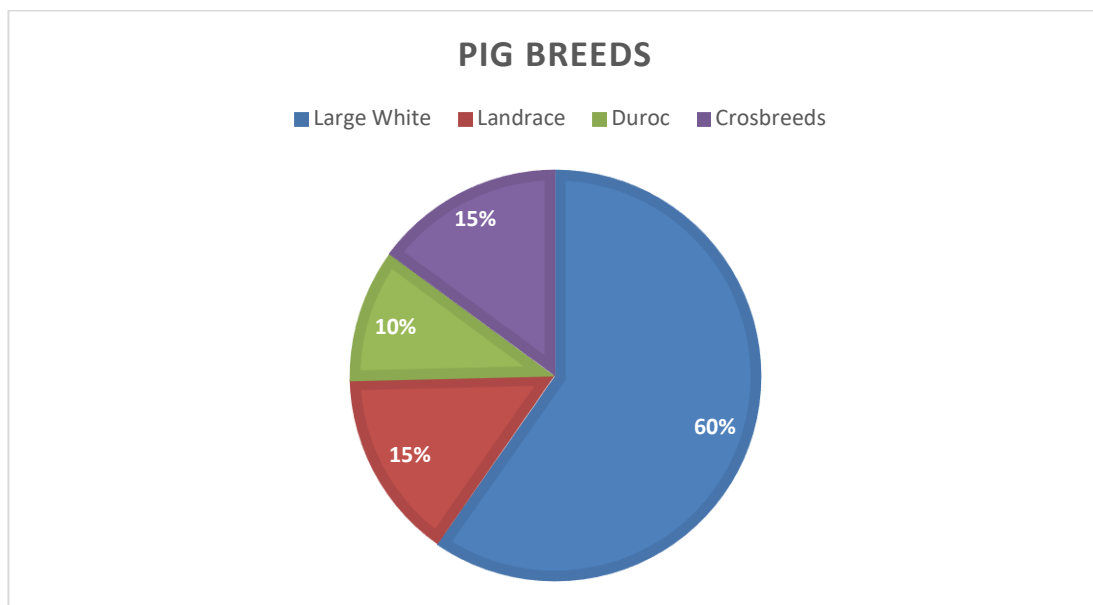
Figure 9: Pig breeds

The Department of Agriculture and Extension Services, (AGRITEX), revealed through a key informant interviews that, pig productivity and general performance are below average, with approximately 30% of the farmers doing well while the rest were struggling. From the results shown in Table (4.3), commercal smallholder pig productivity in Goromonzi district is below minimum standards for the sector. Acceptable average litter size, mortality and weight in 5 months, are 10.4, 77% and 80kg compared to 12, 3% and 100kg respectively (Mutambara, 2013). Akey infomant at Agritex noted that the low productivity was due to low profits which discouraged reinvestment, poor management, lack of veterinary supplies, which were too expensive as they were priced in US$. *"The*

income from pork was low, because of poor quality and low quantity (kgs/carcass)

supplied to abattoirs" noted the Agritex official. This was said to be since farmers gave

less feed to save costs (less than 2kg/day), generally pointing to the fact that farmers do

not have adequate resources. Another factor affecting productivity, was that the farmers

do not stay on the farms and that they do not employ experienced farm managers/workers

because they do not want to pay them. However, AGRITEX through their livestock

division provide training and extension services.

Table 12: Pig productivity

	Mean	**Benchmark**
number of sows	13.67	
number of boars	2.67	
average litter size	10.40	12
average birth weight	1.43	
average weaning weight	5.07	5
average weight at 5 months	56.10	100
average mortality(%)	7.73	3

Most of the farmers (60%) wish to expand their sow units but unfortunately, they have

many bottlenecks. Mortality rate is double (7.7%) than minimum (3%) expected for

commercial smallholder production. Diseases are the major cause of mortality, as

indicated by 60% of the respondents, of which scours were the most common as well as crushing of piglets soon after birth.

4.4.4 Finance

Pig production is capital intensive and requires medium to long term financing to be successful. However, credit services for pig production are generally unavailable to smallholders outside of localized donor funded project schemes. Currently the ZAGP funded by the EU is promoting development of pig value chains in the district, and other areas in Zimbabwe. Pig producers indicated that, even though they had good working relationships with their suppliers, the latter do not offer their services e.g., feed and drugs in advance, but require cash up front. This is because commercial smallholder pig producers do not have supplier contracts. On the other hand, the farmers noted that banks needed collateral for loans, which they did not have.

FGD participants in ward 22, Bromley, noted that they would prefer to have contracts with their suppliers. One farmer indicated that *"We would want contracts, but the current economic situation puts the farmers and suppliers in a difficult position and as such we are forced to operate on a cash only basis which we do not have"* The pig producers felt that Government should subsidise farmers to make their production viable. Another farmer proposed that *"We need to have one currency to stabilise the economy and business for farmers".* These measures were seen to be critical in improving viability of pig production.

The liquidity crisis currently experienced in Zimbabwe has resulted in unavailability of appropriate and cheap credit for farmers. Pig production is a medium to long term

investment requiring credit facilities of the same nature. Currently only short-term credit suitable for short term (one season) agricultural activities is available in the market. Furthermore, the cost of credit is not favourable to borrowers in Zimbabwe with interest rates ranging from 15%- 30% per annum. Microfinance institutions and hard money lenders charge as much as 60% or more interest and this type of lending often leaves farmers in a worse off situation than before. This situation is resulting in farmers and other players experiencing serious limitations in infrastructure development, acquisition of breeding stock, staff housing, stock feeds and working capital. Furthermore, insecure tenure means that farmers cannot use land as collateral.

The study also was noted that farmers did not keep records of their expenditure which made calculation of gross margins impossible. Records are important decision-making tools. One financial institution highlighted that "*farmers are failing to meet the basic record keeping requirement that can help banks calculate the principal loan amount a farm business qualifies for*". He further stated that, "*The face of agriculture has changed to the effect that lending is becoming more and more risky world over and financial institution are now very sceptical thus they make their requirements very steep*". This creates a dead end for farmers who don't have collateral to back their application because land tenure is either on lease or worth very little.

4.4.5 Labour

The major source of farm labour for pig production is a combination of family and hired labour. Family labour constitutes 27% of the total labour force, 13% is hired on part time

basis, 18% is hired on fulltime basis while 42% combines family and fulltime labour. Fig

10 below highlights the various sources of labour
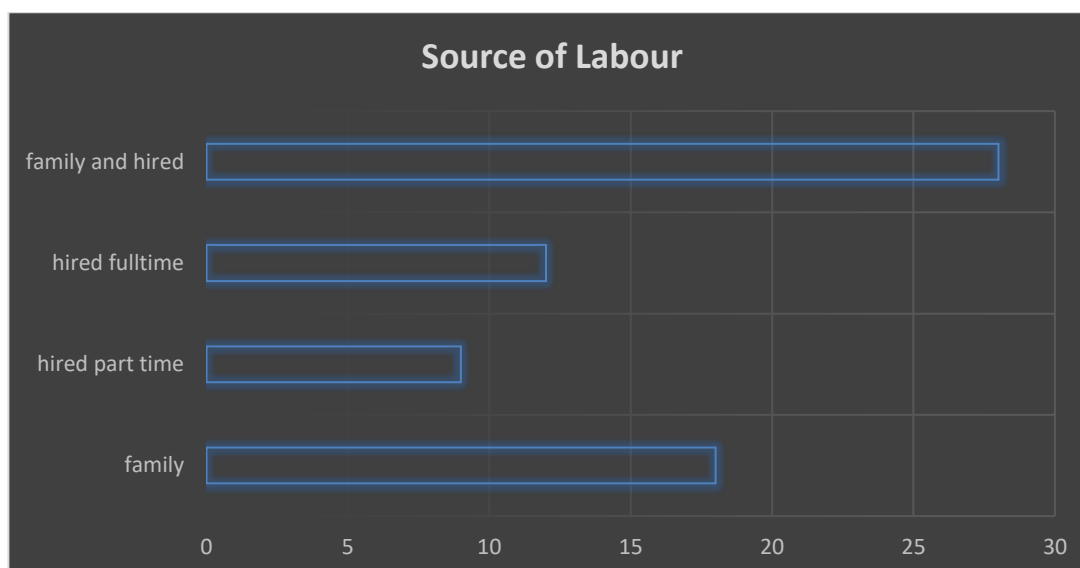
Figure 6: Source of labour

Labour is generally not a challenge in the study are according to the majority of the

respondents. One of the key informants highlighted that labour is usually scarce and

expensive in areas where farmers compete with other sectors especially mining.

Goromonzi district is mainly agro-based.

4.4.6 Knowledge

The study showed that pig farmer experience was in the range of 1 to 7 years with a mean

of 3.8years as shown in (Table 12.) below.

Table 12: Pig farming experience

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation

Number of years in piggery production	67	1.00	7.00	3.8000	1.90100
Valid N (listwise)	67				

19% of the pig producers have no formal training in pig production, compared to 81% with formal training. Further, a cumulative 86% of the farmers have formal education, making it is easier for them to understand technical training. Level of education is important in skills transfer. The skills and management gap imply that there are production and productivity losses accruing to poor management and handling of pigs (Mutambara, 2011).
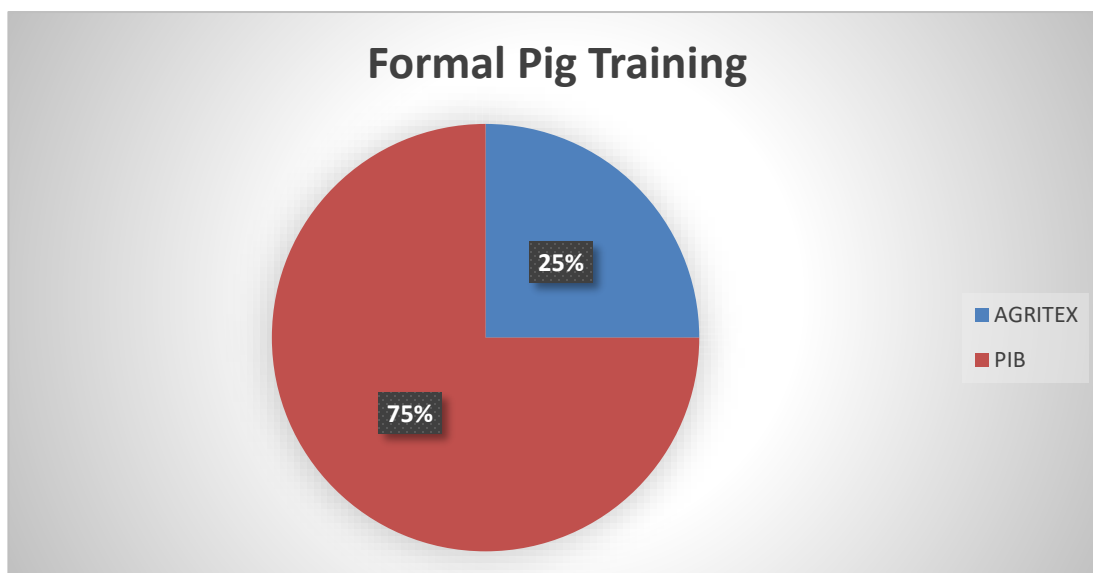
Figure 7: Formal Piggery Training

The identified extension and training service providers include; AGRITEX, PIB, Art Farm and well as other (i.e farmer groups, social media). The results from the study showed that

the biggest training provider was AGRITEX with 40% contribution, followed by PIB with 27%, Other sources had 20% while Art Farm contributed 13% as shown in Fig. 12 below;
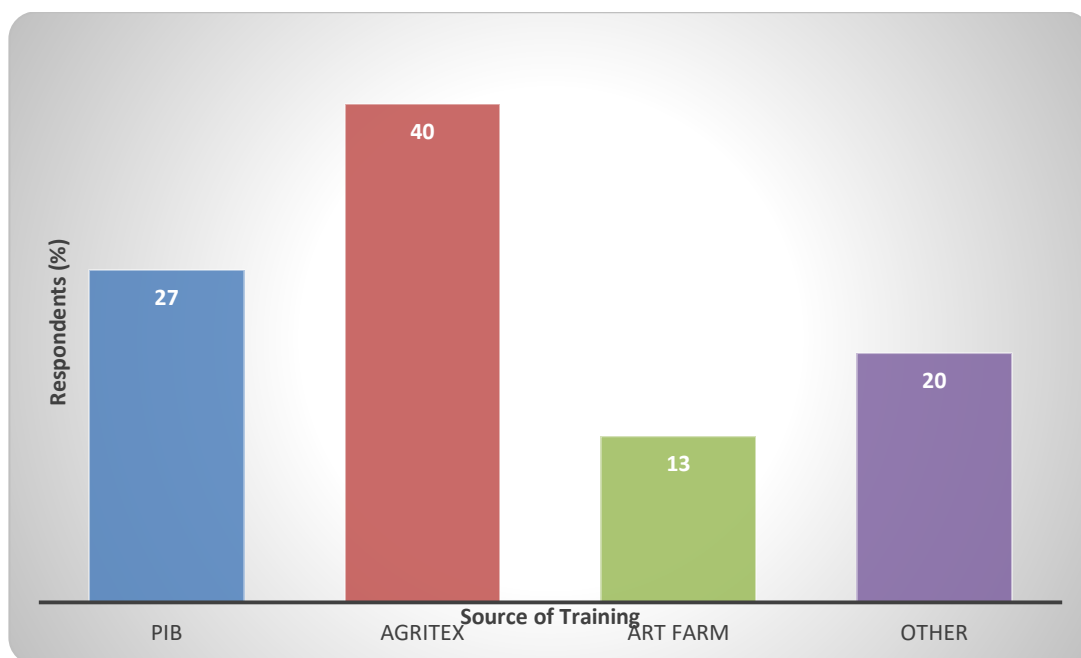
Figure 8: Facilitators of pig production related training

4.5 Primary producers

The focus of this study was on commercial smallholder pig producers although the study area also has many communal and medium and a few large-scale producers. The number of smallholder pig producers increased after the Fast-Track Land Reform Program of 2002. The study revealed that pig producers are faced by too many constraints and are operating below capacity. These constraints include high production costs, lack of support from financial institutions and supplier contracts, weak stakeholder relationships, high disease incidents, high mortality rates, low productivity, low producer prices poor market linkages, market information asymmetry, high inflation, multiple currency, high interest rates, among others.

The study also revealed that farmers in Goromonzi district are not members of any formal pig producer's association. These producer organisations range from farmer groups, cooperatives to apex organisations mostly as economic organisations. Despite the huge benefits of aggregation, small scale pig producers in Goromonzi were not organised. Mukindia., (2014) reported that smallholder farmers tend to be unorganised in the market, sell their limited produces individually without linking with other actors, and thus lack collective action which exposes them to price exploitations. Through collective action by organised farmers, farmers can build up market power and enjoy economies of scale (product bulk buying), reduce transaction costs in markets and mitigate risks associated with individual produce transportation (Delgado, 1999).

4.6 Processors

Access to slaughtering facilities is limited (Figure 9) hence processing is mostly done by the abattoirs and butcheries. However, there is considerable processing capacity in the district. PIB has a slaughter capacity of 200-300 pigs per month while Tilisa has capacity for 400 pigs per month. At Tilisa Abattoir, wholly privately owned, the average producer price paid was RTGS$300 per kg, while they sold to both retailers and individuals at RTGS425, compared to RTGS$230/kg at PIB a government institution. The abattoirs noted that the farmers need to have a valid veterinary and police clearance, booking and identity documents for them to access processing facilities. A slaughtering fee of RTGS$1,000 was charged per pig at Tilisa a private abattoir. PIB does not charge slaughter fees when the farmer is selling to them. Processing included slaughtering and

cutting into various parts, while for PIB they also produced pork products such polony and ham.

Figure 9: Access to pig slaughter facilities

During the key informant interview with one of the abattoirs noted that processing costs were noted to be too prohibitive. Farmers were blamed for producing poor quality pork and failing to meet the quantity demanded. PIB Abattoir noted that other cost drivers were gas, detergents, firewood and fuel.

4.7 Marketing and Distribution

According to Kayonza, (2014) a lack of market linkages for the poor smallholder farmers in most Sub-Saharan African countries poses a significant drawback to market access resulting in increased transaction costs, post-slaughter costs and reduces market efficiency. Improving smallholder farmers' access to markets has become an essential

element in strategies to promote rural development and poverty reduction (Sikwela *et al* 2016). However, these farmers are faced with numerous challenges.

Responses from the majority of farmers showed that they were not satisfied with the producer price in formal markets thus their main market was through the informal marketing channels. Pig products in Goromonzi district are sold in different retail outlets within and outside the district. For interviewed farmers, the average distance to the nearest market by road was 3km. These markets include local butcheries at shops and growth points such as Juru, Bhora, PIB, Tilisa and Mutangadura abattoirs, farm gate (live or slaughtered animals) for individuall buyers and some butcheries, small retail shops and supermarkets. There are also a few individuals who tend to buy livestock products in larger quantities at a time from outlets such as abattoirs, supermarkets, and butcheries all of which generally rank highly in terms of quality. The majority of these bulk buyers come from Harare Metropolitan and Marondera cities.

According to Mutambara *et al*. (2011) prices of livestock products depends on the retail outlet and the level of livestock products processing. In the case of pig products in Goromonzi district, the average producer price was US$3per kg, and US$10/kg for sausages, while in supermarkets the price averages US$4.5/kg for porkchop (Fig. 13).
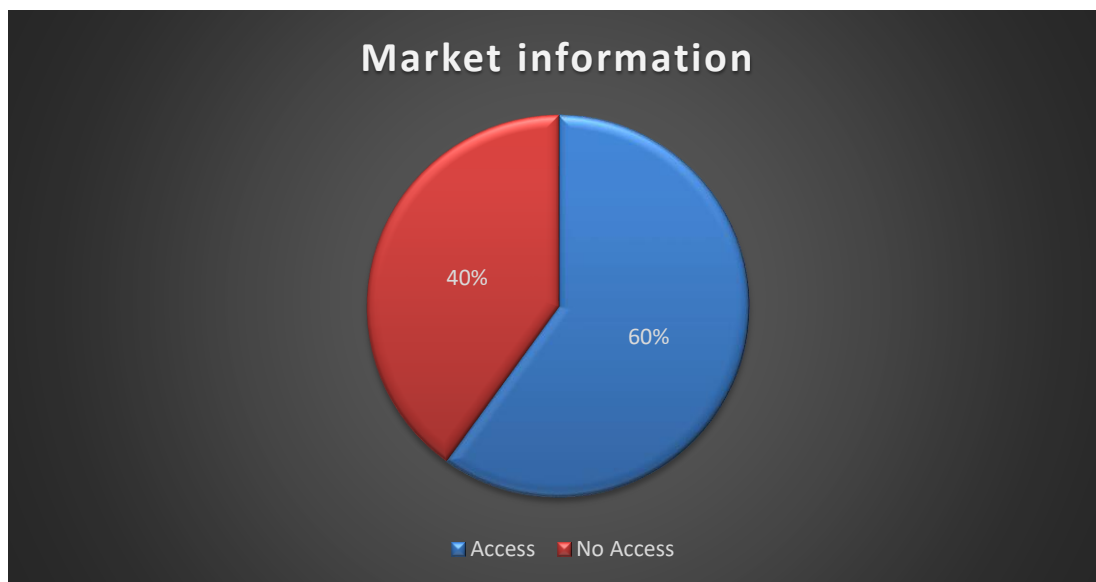
Figure 10: Access to Market information

The majority of the respondents, (60%) indicated that they had access to market information, and 40% did not (Figure 4-7). Integrating smallholder farmers into modern supply chains has been identified as a way to address the ongoing debate about whether small scale farmers can ever be a part of the modern supply chains. Prior research findings by Paloma *et al*., (2020) indicated that smallholder farmers tended to be excluded from the modern marketing chains. The markets that pig producers in Goromonzi are accessing are not modern lucrative markets, but largely local butcheries. They also have limited access to market inteligence (Fig 4.8)
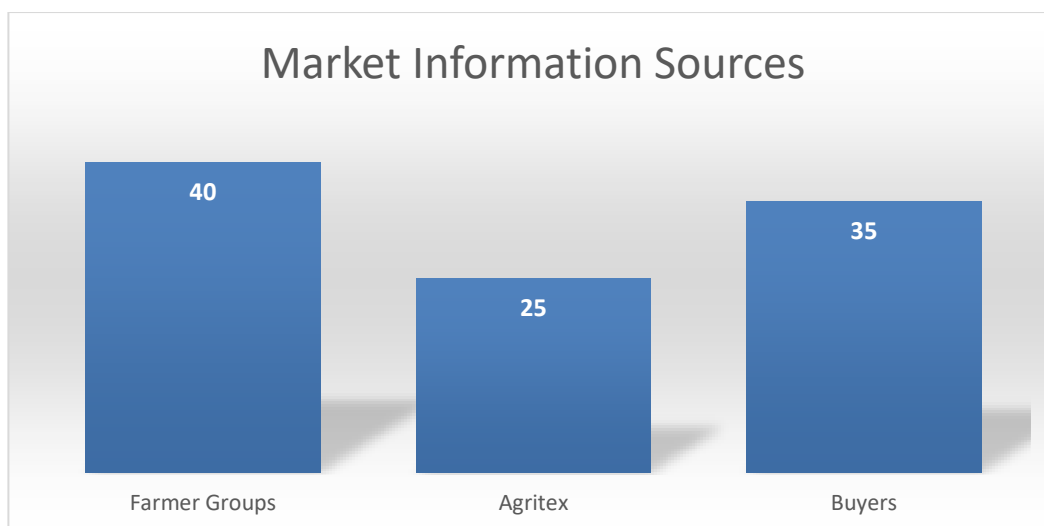
Figure 11: Source of marketing information

Most of the farmers stated that they were located far away from the Harare-Marondera highway and due to poor road networks, most service providers fail to access their farms. They highlighted poor linkages with input and service providers in the study area. This is also in tandem with Alene *et al*., (2008) who stated that transaction costs significantly hinder market participation whereas better market information stimulates it. A study conducted by (Moser *et al*., 2009) noted that transport cost from local market often consume 25%-75% of the destination market price making spatial arbitrage unprofitable and leaving the rural market isolated.

Table 11: Frequency of accessing marketing information

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Daily	15	26.7	26.7	26.7
	Weekly	14	46.7	46.7	73.3

	Fortnightly	38	26.6	26.6	100.0
	Total	67	100.0	100.0	

Kumar *et al*., (2012) classified transaction costs, market information flow, market and road infrastructure as institutional factors that make it more difficult for smallholder livestock producers to access markets. These are some of the marketing constraints being faced by pig producers in Goromonzi. There is need therefore for strategies that help farmers in the future to improve their participation in markets but with reasonable costs that leave farmers with sustainable return on investment. These strategies may include developing more abattoirs and slaughter facilities in the district to avoid transaction and transport costs incurred by long distances travelled by smallholder farmers in trying to reach these facilities.

4.8 Consumers

The consumer is the most important player in the value chain. Goromonzi district is characterised by a few customers and consumers ranging from individuals, butcheries, supermarkets, hotels, eateries, and others. Goromonzi is generally a pork consuming district with a few members belonging to the apostolic sect who do not consume pork. However, one of the farmers belonging to the apostolic sect mentioned that he was doing it for business purposes only although it is against his religious beliefs.

4.9 Value chain governance

Institutional, policy, legal and business environment are important drivers of the pork value chain. The Government of Zimbabwe through its various departments in Goromonzi district is the regulatory authority. There are service charges to be met by pig producers, such as police and veterinary clearing. All these services result in high transport and handling costs (Degado and Tiongco, 2005) as services are centralised away from the pig producers. It should be pointed out that excessive burden imposed by fees and regulatory procedures from public institutions on the livestock value chains which particularly affect raw material importation which in turn add to the price of stock feeds.

However, the purpose of a governance mechanism remains critical, which is to provide, at minimum costs, the coordination, control and trust that are necessary for chain actors to believe that engaging will make them better off (Kuma., 2014). Pig production sector governance is a responsibility of the central government through its various departments represented at district level. The key department involved in promotion of increased production and productivity of pigs, is AGRITEX. They offer training and extension services. Within AGRITEX, the livestock division also has meat inspectors seconded to abattoirs. These assist with quality control and carcass grading. The department of veterinary services, offers animal health services to the farmers and conduct health certification of slaughter stock. The police is involved in the marketing of pigs, by offering security clearance so as to prevent trade of stolen pigs. According to specification on health and safety standards, slaughter of animal for commercial market is supposed to be in registered abattoirs under veterinary and health inspectors. This condition is necessary

to ensure that the necessary health and safety standards are observed for quality and safe products for local, regional and international markets. Abattoirs charge slaughter fees of about 1,000RTGS$ carcass which are reported to be prohibitive, some producers avoid them, compromising on sanitary requirements.

4.10 Marketing margins and income distribution across the pig value chain

There are several factors that determines prices and income distribution along the pork value chain. Value added generated by other actors and their shares in the entire value chains differ among actors in the same market and among actors in the different markets. The figure (4.9) shows the typical pig value chain on average a farmer generates about US$3/kg, accounting for a considerable part of total value added (20- 25 %) in the entire value chain. However, the farmer gains the lowest income and eateries generate the highest income compared to other actors (selling at US$12.5/kg after purchasing from supermarkets at US$3.95/kg). Noticeably, it takes a farmer 5-6 months to finish their pig product, while other actors have more frequent or even daily transactions between abattoirs and retailers. In the study site, the marketing chain can be short, whereby consumers have an option to buy directly from producers at farm gate. However, sales are limited because whole carcasses are sold and not as per kg. According to Chau *et al* (2017) the longer the chain, the higher the price the consumers take and the less market information the farmers receive. Due to an increase in the number of middlemen in the marketing system, the price of pork has gone up. This has led to an increase in demand for internal organs which were not consumed traditionally in the Zimbabwean market. The demand is driven by affordability of this meat compared to the pork itself.

Producer prices are easily measured as all prices relate to cold weights of a carcass that has been graded by a uniform system. As the meat exits the abattoir in different forms, the price obtained by the abattoir is much harder to compare, as is the margin obtained (Figure 4.9). The margin obtained on the sale of primal cuts is however significantly larger than the margin obtained when selling an entire carcass, despite the additional costs involved. The costs obtained by the abattoir can be disaggregated into slaughter costs, as well as additional costs for conversion to primal cuts. The most significant cost component to the abattoir is labour, contributing to 48% of total slaughter costs, followed by electricity and fixed overheads, at 35% of total slaughter costs.

The margin received at abattoir level is greater on a Baconer carcass than on a Porker carcass, whilst margins increase significantly if additional value is added by converting the carcass to primal cuts before sale. Interviews with the 3 abattoirs indicated that abattoirs prefer to slaughter more Baconer pigs than Porker pigs, because mechanization is simplified if the pigs are of uniform size and weight

Though the cost of feed (80% of production cost) is no doubt the most important and sensitive issue regarding the primary producer, other variable costs that have a significant effect on profitability are fuel, electricity, wages, and cleaning materials. In South Africa, Davids., *et al*., (2018) reported that feed and drugs constituted the greatest proportion of pig production costs. Margins at abattoir level are small and profitability is greatly dependant on sufficient throughput levels, resulting in varying levels of coordination between producers and abattoirs. In general, the throughput of the 3 abattoirs in

Goromonzi which was noted to be below optimum, and they do not have supplier contracts due to the volatility for the exchange rate caused by high inflation.

4.11 Constraints and opportunities for smallholder pig value chain development

4.11.1 Constraints in the small-scale pork value chain

The results of two staged least squares have shown that there is still a lot more to be gained should the farmers increase their litter size since the unadjusted coefficient of litter size is more than 1.5. Since the industry doesn't require big space farmers have enough land but not inputs and finance needed to operate at full capacity. Average mortality also came out as significant factor affecting farmers negatively which again tell that farmer still lack resources to acquire needed chemicals, drugs, and food as most of these require foreign currency which is very hard to come by in Zimbabwe in the recent times. Gender variable produced worrying results, showing that the very few female farmers in the industry are struggling, operating in the shadow of their male counterparts supplying less than 30% of what male farmers are supplying.

The results from the study showed that acute shortages of inputs and scarcity of veterinary services were the most notable constraints. Approximately 90% of the respondents claimed that inputs such as feed and drugs were unfairly priced. However, some of the suppliers indicated that they import raw material with foreign currency sourced mainly from parallel markets which increases their production costs impacting negatively of their consumers. The farmers also stated that they are usually forced to buy straight feeds due to inconsistent supply of Concentrate on the market which can reduce feed costs. In addition, farmers also lack financial resources to purchase inputs due low prices of

outputs. The low profit margins make it very difficult for the pig farmers to supply adequate inputs let alone expand their businesses. For product sales, farmers indicated that within their localities, there were few buyers of their pigs and piglets. Those that are there do not offer competitive prices to farmers. Furthermore, some farmers exhibited a tendency to accept any price offered to meet their immediate financial obligations.

What major challenges are you facing?

- Inflation and thus prices (change) increase frequently

- Costs of feeds and drugs are too high

- Banks are not providing farmers with USD to buy drugs

- Producer prices are too low

- Breeding stock is too expensive

- Inadequate credit services

- Shortage of concentrate in stores, farmers forced to buy straight feeds which are more expensive

- Economic instability i.e., USD and RTGS is causing a lot of confusion in the country and the parallel rates are exorbitant

- Market resisting USD based sales, yet services are rated in USD

Source: Author notes pig producer FGD Bromley (Ward 22)

Figure 12: Challenges in the pork value chain in Goromonzi

According to Mutambara (2011) the key internal and external non-regulatory constraints identified with percentage scores were poor breeding stock (84%), electricity gap (70%), abattoir fees (73%), skills gap (67%), shortage of abattoir facilities (57%), low production

capacity (64%), low yield levels (64%), finance (61%) and low demand for pork (47%). The current study identified the same constraints in the pig value chain.

Challenges are not limited to producers only, abattoirs are also faced with many challenges which include banning of the multicurrency regime, through statutory instrument 142 of 2019. As a result, the USD/RTGS exchange situation was making it difficult to satisfy customers due to high volatility of the black market. The latter is used for rating prices of inputs and services, yet abattoirs can only sale and pay in RGTS$. Unpredictable price fluctuations currently affecting the local markets require for strategies that enable market access with other factors of production. Processing costs at the abattoir were noted to be too prohibitive. Farmers were blamed for producing poor quality pork and that they were failing to meet the quantity demanded. For instance, Tilisa has a slaughter capacity of 400, yet rarely operates above 60% per day. On the other, PIB noted that fuel shortages, poor market linkages and shortage of storage space were major challenges that they faced as an abattoir.

4.11.2 Opportunities to increase production and viability of small-scale pig production

What do you think needs to be improved in the pig industry sector?

- Government to decide on one currency

- Farmers need access to unsecured credit facilities

- Government should subsidise farmers

- ZFU must lobby for farmers especially in the marketplace to ensure farmers are treated fairly

- Value addition facilities should be provided in the communities to increase farmer income

- Training and support for farmers; farmer need training on pig production through extension and farm field schools

- Farmers need to be resident on their farms or at least employ skilled personnel

- Farmers should learn to make their own feeds

- Linkages with farmers to market must be facilitated

- Farmers should access USD at bank rate to afford vet supplies

- Suppliers should provide inputs consistently

Source: Author FGD and Key informant interviews collation

Figure 12: Opportunities to improve the pork value chain in Goromonzi

Pig Industry Board which already is providing services to the Goromonzi community is part of the project, which is targeting 56 000 pig farmers in Zimbabwe, who will be aggregated at provincial levels.

4.12 Summary

This chapter presented the results of the study and the discussion. Descriptive statistics on the socio-economic characteristics of the commercial smallholder pig farmers was presented using tables, graphs, and charts. The value chain map was used to show the key stakeholders in the commercial smallholder pig value chain of Goromonzi district. The results of the two stage least squares(2SLS) and Multivariate probit analysis showed the determinants of quantity supplied to the market and market outlet choice were also presented and discussed.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter is a summary of the research, derived conclusions, recommendations, and areas for further study. Value chains are increasingly becoming a useful tool to drive economic development in most developing countries. The results from the study were used to recommend key areas that need improvement in the commercial smallholder pig value chain if the chain is to function effectively and efficiently.

5.2 Discussion

The purpose of this study was to analyse the commercial smallholder pig value chain in Goromonzi district. The results from the mapped value chain showed that the key stakeholders included input suppliers, primary producers (pig farmers), processors, marketing and distribution, wholesalers, traders, and consumers. Value chain analysis presents significant opportunities that are usually drawn from the constraints faced by stakeholders at different levels.

The farmers play a pivotal role of breeding pigs by combining inputs and other factors of production. Much of the risk in the value chain is absorbed by the farmers yet there is little effort that is made to support or cushion them by the government, financial institutions, and insurance companies. Farmers are faced with numerous challenges such as lack of capital, high production cost, lack of technical support and high mortality. As a result, most farmers struggle to survive or grow their businesses and continue to operate below capacity.

Inputs suppliers provide inputs such as feed, drugs and breeding stock which are required to produce pork and pork products that are needed by the consumers. These suppliers

include Feedmix, Fivet, National Foods, PIB amongst others. The suppliers are reliable sources of inputs manufactured locally and imported mainly from South Africa. The main challenge is that farmers complain that these suppliers charge exorbitant prices. However, the suppliers argue that their pricing is fair considering that they purchase foreign currency on parallel markets and only put a small mark up to stay in business.

Processors include Tilisa, PIB and Mutangadura who provide slaughtering and marketing services to farmers. These processors have adequate capacity to serve the district, but farmers perceive their requirements as cumbersome and prefer to slaughter on their farms. The farmers decision to slaughter on the farm usually compromises on the quality of the meat and impacts negatively on the farmers income as well as the processors end up operating below capacity.

Marketing and Distribution includes various stakeholders such as transporters, middleman, marketing agents that assist farmers with market linkages. In most cases, farmers secure their market and hire out transporters to transport their produce to the market. In cases where the farmers have no market, middleman and marketing agents either buy produce from the farmers or secure a market on the farmers behalf for a fee. One of the major problems that arise when farmers deal with agents of middleman is unfair pricing. The market is volatile and farmer organisation are not regularly active in regulating such transactions to protect the farmers interests.

Consumers play a pivotal role in the building of value chain. All activities in the value chain begin and end with the consumer. The consumer determines the product form, time, place, quality, and quantity amongst others. All stakeholders should coordinate to satisfy the consumer needs and wants for their businesses to continue. There is currently poor

coordination between most stakeholders, and this impacts negatively on the functionality of the value chain. More effort needs to be put to strengthen stakeholder relationships.

Marketing Margins and Income Distribution Marketing margin shows the difference between cost of production and the final price paid by the consumer. The results from the study showed that the farmers derive the least benefit (16%, marketing margin) when compared to other stakeholders in the value chain and this is mainly because there is no or little value addition at farm level. Butcheries have a marketing margin of 17%, followed by Supermarkets with 19%, while Abattoirs have 22% and Eateries have 26%. Farmers spend between 5 and 6 months to produce for the market yet other stakeholders spend little time and often have frequent transactions and are more profitable. It is also important to note that farmers outnumber other stakeholders and have an opportunity to bargain collectively and maximise profits, but they are taking advantage of this opportunity mainly due poor coordination amongst themselves. Farmers do not participate in lucrative markets because they are afraid of being conned especially in the capital city and as a result, they prefer local market or middleman who usually offer lower prices. Information asymmetry between all stakeholders gives the others more competitive advantage and opportunity to make more than the others.

Determinants of Quantity Supplied to Market Results from the study showed that litter size (litter), average mortality (mortality) and gender of a farmer (gender) are significant determinants of number of pigs to be supplied by the farmer. The study revealed that most of these challenges arise from poor or no support from financial institutions. Farmers end up compromising standards due to lack of working capital for day-to-day farm operations. Financial institutions offer loan facilities to individuals or businesses that have collateral

of immovable property, and this excludes housing under cooperatives, resettled farms, and rural land. Most of the farmers do not qualify for funding in formal institutions and they end up resorting to microfinance institutions or hard money lenders who start exorbitant interest rates. This increases the cost of production for the farmers considering that there are subsidies from the government, the farmers' return on investment is extremely low.

Female farmer participation in the marketplace is also minimal and mortality is high contributing to less pigs supplied. These factors inhibit the farmers from expanding their herd size for them to increase quantity supplied to the market. Determinants of Market Outlet Choice The findings show that farmer's choice of a market is positively associated with price satisfaction and method of payment. Farmers prefer markets where payments are in the form of cash either in bond notes or in USD rather than transfers (bank or mobile money). Price satisfaction also drew farmers to specific markets offering lucrative prices because this will allow the farmer to cover their production costs and get a good return on investment. Generally, farmers mainly prefer retailers who they offered good prices and had access to cash in bond or USD form. Wholesalers and some consumers buying under the same conditions were also separated.

5.3 Conclusions

This study sought to analyse the commercial smallholder pig value chain by determining the marketing margin and income distribution along the chain. The study also sought to identify determinant of quantity supplied to the market and market outlet choice by pig producers. The results from the study were used to map the value chain map, identifying stakeholders and their roles. The determinants of quantity supplied to the market as well as market outlet choice were also established.

5.3.1 Key stakeholders

The result from this study showed that the key stakeholders in the commercial smallholder pig value chain in Goromonzi district are.

a) Input's suppliers – who provide inputs such as feed, drugs, and breeding stock and these include Feedmix, Fivet, National Foods, PIB, Agritex.

b) Primary producers- these are the farmers that breed pigs combining inputs and other factors of production. They take the risk and produce pigs for marketing.

c) Processors- these include Tilisa, PIB and Mutangadura who provide slaughtering and marketing services to farmers.

d) Marketing and Distribution- various stakeholders such as transporters, middleman, marketing agents that assist farmers with market linkages.

e) Wholesalers and traders- buy produce from the farmer for resale

f) Consumers- take up the produce from the farmer for consumption.

5.3.2 Marketing Margins and Income Distribution

The study showed that the market margin for farmers was 16%, abattoirs had 22%, Butcheries had 17%, Supermarkets and 19% and Eateries had 26%. The results show that the farmers get the lowest share while eateries get the biggest share mainly due to value added. There is need for farmers to add value to increase the income they get. Farmers still outnumber other stakeholders and have an opportunity to bargain collectively and maximise profits, but they are taking advantage of this opportunity.

5.3.3 Determinants of Quantity Supplied to Market

Results from the study showed that litter size (litter), average mortality (mortality) and gender of a farmer (gender) are very significant determinants of number of pigs to be supplied by the farmer. The study revealed that most of these challenges arise from poor or no support from financial institutions. Farmers end up compromising standards due to lack of working capital for day-to-day farm operations. Financial institutions need to provide unsecured loans to ensure liquidity amongst the commercial smallholder farmers. Female farmer participation in the marketplace is also low and mortality is high contributing to less pigs supplied. These factors need to be addressed to ensure more pigs are supplied to the market

5.3.4 Determinants of Market Outlet Choice

The findings show that farmer's choice of a market is positively associated with price satisfaction and method of payment. The results reveal that farmers prefer markets where payments cash in bond or in USD rather than transfers (bank or mobile money). Price satisfaction also drew farmers to specific markets because this will allow the farmer to cover their production costs and get a good reward for their effort. Generally, farmers mainly prefer retailers who they offered good prices and had access to cash in bond or USD form. Wholesalers and some consumers buying under the same conditions were also preferred.

5.4 Implication

The stakeholders within the value chain should create linkages to promote exchange of information, products, and services. This will minimise inefficiencies caused by intrusion of middlemen who capitalise on information asymmetry at the expense of the key stakeholders who are actively involved in the value chain. Farmers can also take advantage of economies of scale by coordinating themselves into bigger groups. This can also strengthen their voice as they lobby with the government, in the marketplace and other organisation that have influence over their day-to-day operations. Policy implications is that stakeholder linkages and information flow should be promoted using relevant channels and institutions. Relationships between stakeholder should also be promoted to improve trust and support amongst player through backward and forward linkages.

5.5 Recommendations

In the current context of smallholder pig production in Goromonzi District, of Zimbabwe, the findings of the study enabled us to make the following recommendations for policy makers, development actors and researchers to improve farmers' market power and income in the pig value chain.

Pork production is capital intensive, across the value chain from primary production through to processing and as a result, significant economies of scale are required to produce profitably. Farmers need support from private and public institutions such as banks, NGOs, and the government. This can be in the form of non-collateral loans with government guarantee, tax waivers or exemptions, low interest rates, and contract farming. There is need for government to issue land permits that are bankable so that farmers can access credit. Furthermore, farmers and input suppliers' access to foreign

currency should be prioritised for importation of input supplies such as drugs and raw materials for manufacturing feed.

Due to the high cost of production, it is highly recommended to promote collective action in both production and marketing especially for input procurement, veterinary service and planning to promote mass production with a certain guarantee of supply and facilitate product uniformity and quality control procedures. There is need to capitalise on collective bargaining opportunities to reduce production cost as well as maximise output returns.

The study showed that high mortality negatively affects viability for the commercial smallholder's pig farmers. This is mainly to due poor management practices and as such there is need for extensive extension support and continuous farmer training to ensure optimum production as well as improving farmers' business skills. The public authorities should promote such initiatives to be done in farmer groups to enhance management capacity building and collective marketing.

The participation of women in the entire value chain is quite low particularly in the marketplace. There is need to promote participation of women at all points of the value chain. More programs that support women participation through funding and capacity building should be enrolled. Youth empowerment programs should also assist the youth to expand their scale of production and significantly contribute towards economic development.

This study confirms that most smallholder pig farmers in Goromonzi district have limited market power, and this generates lowest income for farmers in the pig value chain. Pork processors (butcheries and abattoirs) and pork retailers are the dominant players in the

chain with strong influence on prices. Government should participate in ensuring prices are controlled in the marketplace to protect the farmers and ensure fair income distribution. Multiple currency is also causing a situation were good money chases bad money. This results in high inflation and makes planning difficult especially for the farmers. The government needs to decide on a single currency to ensure consistency in the marketplace. Middlemen should be registered and monitored to promote traceability and fairness especially for the farmers. Price ceilings and price flows should be constantly updated, and information should be at the disposal of all actors.

There is also need to strengthen the linkages among the value chain actors encouraging partnerships, interaction, networking, and information exchange. This will create trust within players and minimise unfair dealings which are usually created by middlemen. Infrastructure development of road networks, value addition facilities and electricity will help improve accessibility to markets and well as increase farmers revenue to improve livelihoods.

Finally, market information system should also be organised to facilitate farmer access to information on price and consumer demand. Farmers should have access to market information to ensure that they make informed decisions on the market outlet choice. Farmers should have access to market information in decentralised government offices in their locality, social media platforms such as Facebook and WhatsApp groups, radio, television, field days and farmer programs.

5.6 Suggestions for Further Research

This study focused the Value Chain Analysis of commercial smallholder pig producers in Goromonzi district, and it was conducted in a specific period. Panel date in districts should be conducted for comparison of findings and improve reliability of data.

REFERENCES

Acharya, B. (2010). Questionnaire design. The Backbone of Research-SaciWaters

Adenuga, A. H., H. Fakayode, S. B., & Adewole, R. A (2013). *Marketing Efficiency and Determinants of Marketable Surplus in Vegetable Production of Kwara State, Nigeria*. Fourth International Conference, African Association of Agricultural Economists (AAAE) 22–34, September 22-25, 2013, Hammamet, Tunisia 160533.

African Development Bank (2014). Agricultural Value Chain Financing (AVCF) and Development for Enhanced Export and Competitiveness.

AFDB, A. (2014). *Agricultural Value Chain Financing (AVCF) and Development for Enhanced Export Competitiveness*. AFDB publications (c) 01 BP 1387 Abidjan 01 Côte d'Ivoire.

Aguko, S.O. (2014). Value chain analysis and organizational performance of beer manufacturing companies in Kenya. Semantic Scholar.

Ahmed N.A., Graeme M., Malcom D., Diaa A.K., Mohamed F., Gamal E.N. (2012). Value Chain Analysis of the Egyptian Aquaculture Sector. Semantic Scholar.

Alene, D. A., Manyong, V. A., Omanya, G., Mignouna, H. D., Bokanga, M., & Odhiambo, G. D. (2008). Smallholder marketed surplus and input use under transactions costs: Maize supply and fertilizer demand in Kenya. *Food Policy*, 32(4), 318–328.

Almaz, G., Workneh, N., Edilegnaw, W., & Gezahegn, A. (2014). Constraints of Vegetable Value Chain in Ethiopia: Gender Perspective. *International Journal of Advanced Research in Management and Social Sciences*, *3*(12), 32–44.

Anteneh, A., Muradian, R., & Rueben, R. (2011, December 1). *Factors affecting Coffee Farmers Market Outlet Choice in Ethiopia.* EMNet 2011 in Cyprus, Radboud University, the Netherlands.

Angrist, J. D., & Imbens, G. W. (1995). Two-stage least squares estimation of average causal effects in models with variable treatment intensity. *Journal of the American Statistical Association*, 90(430), 431-442.

Berhanu, K., Derek, B., Kindie, G., & Belay, K. (2014). Factors Affecting Milk Market Participation and Volume of Supply in Ethiopia. *Asian Journal of Rural Development, 4 (10)*, 1–15.

Bezabih, E., & Mengitsu, N. (2011). *Potato Value Chain Analysis and Development in Ethiopia: Case of Tigray and SNNP Regions*. International Potato Centre (CIP-Ethiopia), ILRI.

Bongiwe, G. X., & Micah, B. M. (2013). Factors affecting the Choice of Marketing Channel by vegetable Farmers in Swaziland. *Sustainable Agriculture Research*, *2*(1), 88–105.

Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development.* (Vol. 1). Sage Publications, Inc.

Braun, V., & Clark, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Cohen, M., & Da Silver, C. A. (2007). Value Chain Finance in agriculture: Enterprise Development and Microfinance. *Journal of Developmental Studies*, *13*(2–3), 95–108.

Chalwe, S. (2011). *Factors Influencing Bean Producers' Choice of Marketing Channels*

in Zambia. University of Zambia.

Cohen, L, Manion, L., & Morrison, K. (2001). Research Methods in Education, Routledge. *Http://Lst-Iiep.Iiep-Unesco.Org/Cgi-in/Wwwi32.Exe/[In=epidoc1.in]/?T2000=011160/ (100).*

Cohen, L., Manion, L., & Morrison, K. (2000). Research Methods in Education. *Http://Lst-Iiep.Iiep-Unesco.Org/Cgi-Bin/Wwwi32.Exe/[In=epidoc1.in]/?T2000=011160/(100).*

Collis, H. (2003, November 12). *Qualitative and Quantitative Research Methods*. Www.Ukessays.Com. https://www.ukessays.com

Cox, L. (2009, September). *Direct Marketing of your agricultural products*. Http://Www.Ctahr.Hawaaii.Edu/Sustainable/News/Articles/V2-Cox-DM.Pdf. http://www.ctahr.hawaaii.edu/sustainable/news/articles/V2-Cox-DM.pdf

Davids, P., Jooste, A., & Meyer. F. J. (2018, September). *Evaluating the South African pork value chain*. https://www.ifama.org/resources/files/2014-Conference/1008.pdf

Degado, C., & Tiongco, M. (2005). *Contract farming of milk and poultry in India: Partnerships to promote the environmentally friendly and equitable intensification of smallholder market-oriented livestock production*. IFPRI, FAO and International Fund for Agricultural Development (IFAD) Conference, Nairobi, Kenya.

Delgado, C. L. (1999). Sources of growth in smallholder agriculture in Sub-Saharan Africa: The role of vertical integration of smallholders with processing and marketers of high value-added items. *Agrekon*, *38*(4), 165–189.

Food and Agriculture Organization of the United Nations (FAO) (2011). *Price and Market-Structure Analysis for some selected Agricultural commodities in Sudan: Marketing Costs and Margins.* Food and Agriculture Organisation.

Food and Agriculture Organization of the United Nations (FAO) (2017). *Food and Agriculture Organisation of the United Nations and Practical Action Pubishing* (pp. 55–76) [Technical Report]. FAO.

Food and Agriculture Organization of the United Nations (FAO) (2020). *Zimbabwe at a Glance*. Http://Www.Fao.Org/Zimbabwe/Fao-in-Zimbabwe/Zimbabwe-at-a-Glance/En/.

Government of Alberta. (2010, November). *Understanding supply factors for Agricultural products.* https://www.alberta.ca/index.aspx

Greener, S. (2008). *Business Research Methods.* (2nd ed., Vol. 1). Ventus Publishing.

Harbott, A. (2010). *What is Value chain analysis?* Https://Harbott.Com/What-Is-Value-Chain-Analysis-273f94ae7004?Gi=c699e07b2a5b.

Hellin, J., & Meijer, M. (2006). *Guidelines for Value Chain Analysis.* (1st ed., Vol. 1). Ventus Publishing

Holland, R. (1998). *Selling price, gross margin and mark-up determination*. Agricultural Extension Centre, The University of Tennessee.

Hussain, M., & Aslam, M., & Rasool, St. (2013). An estimation of marketing margins in the supply chain of tobacco in district Faisalabad, Pakistan. *Academic Research International*, 4, 402-408.

Jurevicius, O. (2013, November). *Value Chain Analysis*. Https://Strategicmanagementinsights.Com/Tools/Value-Chain-Analysis.Html.

Kalule, S., & Kyango, J. (2013). Marketing margins and efficiency of cooking banana retail trade in Kampala City, Uganda. *International Journal Sales and Marketing, 3*(3), 9–18.

Kaplinsky, R. (2001). Globalization and Unequalisation: What can be learned from Value Chain Analysis. *Journal of Development Studies*, *37*(2), 117–146.

Kaplinsky, R., & Morris, M. (2002). *A Handbook for Value Chain Research*. Prepared for the IDRC, 113.

Kayonza, M. (2014). *Strategies to link smallholder pig farmers to formal markets for enhanced livelihoods in Goromonzi district, Zimbabwe.* Department of Social Sciences Wageningen UR.

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques* (2nd ed., Vol. 2). New Age International Publishers,.

Kuma, B., Barker, D., Getnet, K., & Kassa, B. (2013). Factors Affecting Milk Marketing Participation and Volume of Supply in Ethiopia. *Asian Journal of Rural Development, 4*(1), 1–15.

Kuroiwa, I. (2021). Method of value chain mapping with international input-output data: application to the agricultural value chain in three Greater Mekong Subregion countries.

Lancon, F., Temple, L., & Bienabe, E. (2017). The concept of Filiere or Value Chain: An Analytical Framework for Development of Policies and Strategies.

Lukuyu, B., Kangethe, E., Ouma, E., Lutakome, P., Isiko, J., & Meeijer, P. (2021). Needs analysis for the smart pig feeding training for extension service providers in Mukono and Masaka districts, Uganda. Nairobi, Kenya: ILRI.

Lobiondo-Wood, G., & Haber, J. (2013). *Nursing research in Canada. Methods, critical appraisal, and utilization.* 3rd Canadian edition. Toronto: Elsevier.

Mahilet. (n.d.). *Factors Affecting Milk Marketing Participation and Volume of Supply in Ethiopia. https://repo.mel.cgiar.org/handle/20.500.11766/5266*

Maimouna, T., & Jing, W. (2013). Marketing margin analysis of tomato in the district of Bamako, Republic of Mali. *Journal of Agricultural Economics and Development*, *2*(3), 089–089.

MAMID. (2010). *Development efforts in Zimbabwe and their alignment with CAADP targets and principles CAADP implementation in Zimbabwe.* [Progress report]. Ministry of Agriculture Mechanisation and Irrigation Development (MAMID).

Mandizvidza, K. (2017). *Analyzing Marketing Margins and Direction of price Flow in the Tomato Value Chain of Limpopo Province*. University of Limpopo.

Mangisoni, J. (2006). *Markets, Institutions and Agricultural Performance in Africa.* (ATPS Special Paper Series , No. 27). the African Technology Policy Studies (ATPS), Network.

Manza, C.A.G., & Atala, T.K. (2014). Socio-economic characteristics of farming households and asset ownership of households in the PROSAB and non PROSAB project areas in southern Borno State, Nigeria. *Journal of Agriculture and Environmental Management*, 3(3), 175-183.

McGlone., J. J. (2013). The future of pork production in the world: Towards sustainable, welfare-positive systems. *The Future of Farm Animal Welfare*, *3*(2), 401–415. https://doi.org/10.3390/ani3020401

Melse, T., Goshu, D., & Tilahun, A. (2018). Determinants of outlet choices by smallholder

onion farmers in Fogera district Amhara Region, Northwestern Ethiopia. *Journal of Horticulture and Forestry*, *10* (3), 27–35.

Moser, C., Barrett, C., & Minten, B (2009). Spatial Integration at Multiple Scales: Rice markets in Madagascar. Agricultural Economics, 40[3]: 281-294

Mthombeni, D.L., Antwi, M.A. & Oduniyi, O.S. Factors influencing access to agro-processing training for small-scale crop farmers in Gauteng province of South Africa. *Agriculture & Food Security* 11**,** 31 (2022).

Mukiama, B. K., Suphanchaimatand, N., & Sriwaranun, Y. (2014). Factors influencing vegetable farmer's choice of marketing channel in Khon Kaen, Thailand. *Khon Kaen Agriculture Journal.*, *42*(4), 595–604.

Mukindia, B. M. (2014). Influence of collective action on market access among smallholder banana farmers in Imenti South District, Kenya. *International Journal of Social Sciences and Project Planning Management*, 1 (2), 99-110.

Muluken., A. (2014). *Value Chain Analysis of Fruits for Debub Bench Woreda, Bench Maji Zone. MSc Thesis. MU: Mekelle.* MU: Mekelle.

Mutambara, J. (2013a). *A preliminary review on regulatory constraints affecting pig industry in Zimbabwe.* [Study done for AFD and DBSA]. University of Zimbabwe.

Mutambara, J. (2013b). A preliminary review on regulatory constraints affecting pig industry in Zimbabwe. *Livestock Research for Rural Development*, *25*(3), 67–86.

Mwaniki, A. (2006). *Achieving food security in Africa: Challenges and Issues*. Cornell University, U.S. Plant, Soil and Nutrition Laboratory.

Ngeywo, J., Basweti, E., & Shitandi, A. (2015). Influence of Gender, Age, Marital Status and Farm Size on Coffee Production: A case of Kisi County, Kenya. *Asian Journal*

of Agricultural Extension, Economics & Sociology, 5(3), 117–125.

Nyaupane, N. P., & Gillespie, J. M. (2010, February 6). *Factors Influencing Producers' Marketing Decisions in the Louisiana Crawfish Industry. Department of Agricultural Economics and Agribusiness,* Southern Agricultural Economics Association Annual Meeting, Orlando, FL, Louisiana State University Agricultural Center Baton Rouge, LA.

Okello, J.J., Al-Hassan, R., Okello, R.M. (2009). A framework for Analyzing the Role of ICT in Agricultural Commercialization and Household Food Security.

Oliver, V. (2010). 301 Smart Answers to Tough Business Etiquette Questions, Skyhorse Publishing, New York USA

Onumah, E. E., & Acquah, H. D. (2010). Frontier Analysis of Aquaculture Farms in the Southern Sector of Ghana. *World Applied Journal*, *9*(7), 826–835.

Paloma, S. G., Riesgo, L., & Louhichi, K. (2020). *The Role of Smallholder Farms in Food and Nutrition Security*. Springer.

Pandey, K., Tiwari, D., & Upadhyay, S. (2013). *An Economic Study on Marketed Surplus of Chickpea in Rewa District of Madhya Pradesh, India.* Department of Agriculture Statistics, V.C.S.G. College of Horticulture, Uttarakhand University of Horticulture and Forestry.

Pig Industry Board (PIB). (2010). *Farmers Handbook on pig production manual* (3rd ed., Vol. 1). Food and Agriculture Organization of the United Nations With Financial Assistance from the European Commission.

Ranjan, R., Shivamurthy, M., Rama, B. Radhakrishna. Impact of value addition training on participants of farmers training institutes. Agricultural Economics, Sociology

and Education. (Pages 1401-1411)

Riziki, J., Mlongo, M., P., Nkurumwa, M., Oradu, A., & Ipomai, S. (2015). Determinants of Choice of Marketing Outlets for African Indigenous Vegetables among Agro-Pastoral Maasai of Narok and Kajiado Counties of Kenya. *Journal of Economics and Sustainable Development*, *6*(8), 58–97.

Sikwela, M.M., Fuyane, N. and Mushunje, A. (2016). The role of cooperatives in empowering smallholder farmers to access markets: A case study of Eastern Cape and KwaZulu Natal cooperatives in South Africa. *International Journal of Development and Sustainability*, 5(11), 536-552.

Simon, H. A. (1982). *Models of bounded rationality* (1st ed., Vol. 1). MIT press.

Tadelis, S., Williamson, O. (2012). Transaction Cost Economics. University of California, Berkeley.

TechnoServe (2019). The Small Commercial Farmer Model as a mechanism for rural development.

Thi Minh, C., Lebailly, P., & QuangTrung, T. (2014, August). *Enhancing farmers' market power and income in the pig value chain; a case study in Bac Giang province, Vietnam.* http://www.lrrd.org/lrrd29/12/ltmc29221.html

United Nations International Development Organization (UNIDO). (2009). *Agro-Value Chain Analysis and Development* (3:34.). Vienna International Centre.

United States Agency for International Development. (2010a). *Zimbabwe Agricultural Sector Market.* (pp. 70–71). USAID.

United States Agency for International Development. (2010b). *Zimbabwe Agricultural Sector Market.* (pp. 70–71) [Progress report]. USAID.

Wegi, B., Belaineh, L., & Jema, H. (2017). Econometric Analysis of the Determinants of Quantity of Potato Supplied to the Market: The Case of Jeldu District of Oromia National Regional State, Ethiopia. *Journal of Economics and Sustainable Development*, *8*(13), 48–66.

Yamane, T. (1967). Methods of Social Research. *Journal of Geoscience and Environment Protection, 4*(5), 344–389.

Zamasiya, B., Mango, N., Nyikahadzoi, K., & Siziba, S. (2014). Determinants of soybean market participation by smallholder farmers in Zimbabwe. *Journal of Development and Agricultural Economics, 6*(2), 49–58.

ZIMTRADE. (2016). *Exports of pork and pork products: Zimbabwe's Trade performance.* Printflow Government Printers, Harare, Zimbabwe.

APPENDICES

APPENDIX 1: QUESTIONNAIRE

This instrument is designed for the purpose of collecting information on value chain analysis of commercial smallholder pig production in Goromonzi District of Zimbabwe. Your answers will be held in strict confidence and will be used only for statistical purposes.

Instructions: *Please tick or fill in **ALL** the spaces provided.*

SECTION A: Demographic data

Name ofFarm...Ward…………………………...........

	Male		Female	Gender:

Age:

	21-35		46-65
	36-45		65+

Highest Level of Education:

	Primary		Tertiary

	High School		None

Type/Location of Farm:

	Communal		Peri-urban
	Resettled		

Farm Size:

	1-25		51-75
	26-50		76-100

SECTION B: Technical efficiency

7. How long have you been in the piggery

business?...

8. What type of breeds do you possess?

   □ Exotic   01

   □ Cross   02

   Please

Specify...

9. Please fill in the following table:

No. of Sows	No. of Boars	Boar: Sow ratio	Average Litter	Average birth	Average weaning	Average weight	Average mortality

10. At what stage is mortality highest?

      □ Piglets   01

      □Weaners   02

      □Maturity   03

Please explain major causes of mortality (e.g. crushing, diseases etc)

....

11. Do you have access to extension services?

      □ Yes   01

      □ No   02

12. Do you keep records?

      □ Yes   01

      □ No   02

13. Do you have slaughtering facilities?

      □ Yes   01

      □ No   02

SECTION C: Cost of production

14. Where do you source the feed for your pigs?

      ☐ National Foods   01

      ☐ Feed Mix   02

      ☐ Profeeds   03

      ☐ Homemade   04

b). If answer to 11 is home-mix, please indicate ingredients.

……………...

....

c). Please fill in the table below;

Item	Quantity	Unit Price	Total cost/month
Feed			
Labour			
Chemicals			
Transport			
Maintenance			
Extension			
Water & Lights			
Miscellaneous			
Total			

SECTION D: Marketing

15. Do you secure a market before/after production?

      ☐ Before production   01

      ☐ After production   02

16. How often do you slaughter for sale?

□ Weekly   01

□ Fortnightly   02

□ Monthly   03

□ Randomly   04

17. At which stage do you sell your pigs?

□ Weaners   01

□ Gilts   02

□ Sows   03

□ Growers   04

18. Where do you sell your pigs?

□ Local community   01

□ Middle men   02

□ Other (please specify) ……………………………………… 03

19. Please fill in the table below:

Output	Quantity	Price/kg	Total Revenue p/m
Live mass			
Carcass			
By-products			

Total Sales per Month			

20. How far is your farm from market?

□ 0-10 km   01

□ 11-20 km   02

□ 21-30 km   03

□ 30+   04

Section E: Financing

Please fill in the following table;

Capital	Source	Principal	Interest	Payment Period	Total repayable amount	Liabilities
1.						
2.						

22. What are the factors affecting pig production:

Factor	Yes	No
Lack of access to financial support (bank loans,		
High cost of inputs (feed, chemicals. Etc)		

Poor access to markets (infrastructure, information,		
Diseases		
Poor access to services (extension, police clearance,		
Low producer prices		
Low demand for pork products		

23. Do you have any comments or suggestions?

1)...

.....

2)...

.

APPENDIX 2: INTERVIEW QUESTIONS

Farmer focus group discussion

(1) For how long have you been producing pigs?

(2) Who are your main input suppliers?

(3) How can you describe your relationship with your suppliers?

(4) What is your contractual relationship with these suppliers?

(5) What major challenges are you facing?

(6) Do you receive valuable support and technical advice from your suppliers?

(7) What ways do you think needs to be improved in the pig industry sector?

Key informant –AGRITEX, PIB, LPD, Triple C, ZFU

(1) What is the overall performance of commercial smallholder pig value chain Goromonzi district?

(2) Who are the stakeholders in the pig value chain?

(3) What is your role in the pig value chain?

(4) Can you describe your relationships between you and the various stakeholders in the value chain?

(5) Do you offer any support and technical advice from your suppliers?

(6) What are the challenges faced by the stakeholders in the value chain?

(7) How can these challenges be solved?

Key informant – Processors and abattoirs

(1) How best can you define your relationship with commercial smallholder pig producers?

(2) What requirements do farmers need to have access to your processing

facilities?

(3) What volumes of pigs you require for processing per month?

(4) What the average price you pay to farmers per kilogram?

(5) What costs is your average cost of production per pig?

(6) What is your selling price per kg of processed meat?

(7) What challenges are you currently facing?

(8) How do you think these challenges can be solved?

Key Informant- Consumers

1. Name:

   …………………………………………………………………………….

2. Age:

   …………………………………………………………………………………

3. Sex:

   …………………………………………………………………………………….

4. Marital Status:

   ……………………………………………………………………………

5. Educational status:

   …………………………………………………………………………..

6. Religion:

   ……………………………………………………………………………..

7. Means of income generations:

……………………………………………………….

8. Do you consume pork meat?

………………………………………………………

9. Where do you normally buy the meat?

………………………………………………….

10. Do you have difficulty in obtaining sufficient supplies?

………………………………

11. How often do you buy pork meat?

……………………………………………………….

12. How much pork and pork products do you consume per month?

……………………..

13. How much do you spend on pork and pork products of your disposable income?

……

……………………………………………………………………………………………………

……

14. What is the average price you pay per kg?

………………………………………….

15. Do consider any quality requirements when purchasing your pork meat?

…………….

16. Do you think smallholder pork farmers are efficient and competitive?

………………

17. If No, to Q16 Please explain:

…………………………………………………………..

………………………………………………………………………………………………

……

18. what should be done to increase pork consumption?

…………………………………..

………………………………………………………………………………………………

……

APPENDIX 3: INFORMED CONSENT

INFORMED CONSENT FORM: ENGLISH

My name is Praise Tariro Mushore and I am a final year Master of Science Agribusiness Management student at Africa University. In fulfilment of the requirements of this programme I am undertaking a study entitled, "**Value Chain Analysis of commercial smallholder pig production in Goromonzi District of Zimbabwe".** I kindly request for your participation in this study by filling in the spaces provided on the questionnaire.

The results of this study are expected to help improve efficiency in the smallholder pig value chain. This will help increase disposable income and improve livelihoods for the farmers and other stakeholders in the entire value chain. Further, it will create opportunities to export produce collectively by the farmers thereby increasing foreign currency earnings for the nation.

Your participation in this study is entirely voluntary. No material or monetary reward will be given for your participation. You have the right to withdraw from participation at any point. You are also not obliged to answer any questions that make you feel uncomfortable. The completion of the questionnaire is expected to take between 15 to 20 minutes. Individual results and personal information such as your name shall remain confidential. Numbers or pseudonyms will be used instead. You may ask any questions or seek clarification on any aspect before signing this form. If you have read and understood, could you please sign in the space provided below as an indication that you have decided to participate in this study.

……………...   …………………

Name of research participant (please print)   Date

………………………………………...

Signature of participant

If you feel you have other questions, have been treated unfairly, promises of confidentiality and anonymity have not been adhered to or you need to speak to someone other than the researcher regarding this study, please feel free to contact Africa University Research Ethics Committee on telephone (020) 60075 or 60026 extension 1156 or email aurec@africau.edu.

INFORMED CONSENT FORM: SHONA

Zita rangu ndinonzi Praise Tariro Mushore. Ndiri mudzidzi weMaster of Science Agribusiness Management paAfrica University. Muzvidzidzo zvangu ndiri kuita ongororo yekurimwa kwenguruve, nezviitiko zvose zvinoitwa kusvikira pakutengeswa kwadzo nevarimi vemuGoromonzi mu Zimbabwe. Ndinokumbirawo kutimubatirane neni muongororo iyi kuburikidza nekupindura mibvunzo yakapihwa.

Zvichabuda muongororo iyi zvichabatsira kupa mazano anoita kuti pave nekufambidzana kwakanaka pane vose vane chekuita nezvekurimwa kwenguruve. Izvi zvinozobatsira kuti

basa riitwe nemazvo kuitira kuti varimi vawane mari yakawanda pakushanda kwavo. Zvakare zvinobatsira kuvhura mikana yekutengesa nguruve kunze kwenyika zvinozoita kuti varimi vawane mari yekunze inesimba rakawanda rekutenga uye zvinozobatsira budiriro munyika ye Zimbabwe.

Munotenderwa kubatirana neni musarudzo iyi nechido chenyu. Hapana chipo kana mubayiro kana wamuchapihwa pakubatirana neni uye makasunynguka kubuda muongororo iyi chero nguva. Hamusungirwi kupindu ramibvunzo yamusina kusunynguka kupindura. Kupindura mibvunzo iyi kunotarisirwa kutora nguva ingaita maminitsi gumi nemashanu kana makum imaviri. Zvamuchataura kana mazita enyu hazvizoshambadzwi asi zvichachengetedzwa. Makasunynguka kubvunza zvamungada kunzwisisa musati maisa runyoror wenyu. Kana maverenga manzwisisa isai runyoro rwenyu panzvimbo yakapihwa pazasi zvichitaridza kuti matenderana nekubatirana neni paongororo iyi.

…………………………...................... …………………

Zita renyu   Zuva

……………………………….........

Runyoro rwenyu

Mukange muchida kutaura nemumwe asiri muongorori uye kana muine imwe mibvunzo makasunynguka kubata veAfrica University Ethics Committee panhamba dzinoti (020) 60075 kana 60026 extension 1156 kana kunyorera tsamba pa aurec@africau.edu

APPENDIX 4: AUREC APPROVAL

Ref: AU986/19   3 May, 2019

Praise Tariro Mushore
C/O CHANS
Africa University
Box 1320
MUTARE

RE: **VALUE CHAIN ANALYSIS OF COMMERCIAL SMALLHOLDER PIG PRODUCERS**
     IN GOROMONZI DISTRICT OF ZIMBABWE

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics
Committee for review. Please be advised that AUREC has reviewed and approved your application to
conduct the above research.

The approval is based on the following.
a) Research proposal
b) Questionnaires
c) Informed consent form

- **APPROVAL NUMBER**   AUREC986/19
  This number should be used on all correspondences, consent forms, and appropriate
  documents.
- **AUREC MEETING DATE**   NA
- **APPROVAL DATE**   May 3, 2019
- **EXPIRATION DATE**   May 3, 2020
- **TYPE OF MEETING**   Expedited

After the expiration date this research may only continue upon renewal. For purposes of renewal, a
progress report on a standard AUREC form should be submitted a month before expiration date.

- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject
  safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any
  changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be
  submitted to AUREC.

Yours Faithfully

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)

0 3 MAY 2019

APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

MARY CHINZOU – A/AUREC RESEARCH ETHICS OFFICER
FOR CHAIRPERSON, AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

APPENDIX 5: URKUND ANTIPLAGIAISM REPORT

Curiginal

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