AFRICA UNIVERSITY
(A United Methodist-Related Institution)

IMPACT OF AGRO-DEALER INPUT DISTRIBUTION SYSTEM ON SUGAR-BEAN FARMERS PRODUCTIVITY IN MUTASA DISTRICT, ZIMBABWE

BY

LAZARUS MASUNUNGURE

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRIBUSINESS MANAGEMENT IN THE COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

2022

Abstract

Limited access to necessary agro-inputs has been the cause of low agricultural productivity and the overall poor economic growth and development in most parts of Sub-Saharan Africa. Agro-input dealers play a vital role in guaranteeing that farmers have access to essential agricultural inputs necessary in contributing to boosting agricultural productivity. Agro-dealers have potential to drive development efforts in rural areas especially beyond the efforts of government input subsidies, development aid, donor and foreign aid agencies, by being the pivotal point driving smallholder development through capacity building efforts that will result in boosts in productivity. Sustainability of the intervention is thus a problem. This study therefore seeks to assess the impact of an agro-dealer's input distribution systems in improving sugar bean smallholders' productivity at local and community level. A cross sectional study was conducted in four wards in Mutasa District, Manicaland, Zimbabwe. The study adopted an analytical cross sectional quantitative research. The target population was smallholder sugar-bean farmers that were exposed (adopted) to the Agro-dealer input distribution system and those that were not exposed (not adopted) to the Agro-dealer input distribution system between the 2020 to 2021 cropping season. The study used one agro-dealer's input distribution system. The agro-dealer has structured distribution points in Mutasa District that are ideal for the purposes of gathering information on the impact of their input distribution system. A small sample of the sugar-bean smallholder farmers in Mutasa District was purposively selected from Wards 15, 16, 19, and 20 to represent the study population. The researcher collected cross sectional primary data through personally administered interviews using structured questionnaires from the four wards of Mutasa District. Data collected was cleaned before entering into Microsoft Excel and exported to Statistical Package for Social Sciences for analysis. Data was analysed using descriptive statistics, gross margin analysis and multiple regression model in econometric analysis. Results showed that seasonal shortage of inputs; high cost of inputs; lack of extension advice and distance to input markets emerged as the major challenges affecting smallholder farmers in acquiring farm inputs in Mutasa District. The study revealed that access to hybrid seeds, fertilizers, pesticides and fungicides; distance to input markets, household size and off farm income are variables that are statistically significant in influencing smallholder's productivity. The conclusion of the study is that an agro-input distributor located in the community, who is well stocked and prepared for each seasonal production, has an impact on productivity of smallholders in the area. Recommendations are that Agro-input distributors have opportunities to scale up sales and turnover if they stock timely and in bulk in local communities. Policy makers can encourage agribusiness value chains to relocate to rural or community areas if they enforce policies that improve infrastructural development of these areas.

Key words: Agro-input distribution, sugar bean, regression, productivity.

Declaration Page

I declare that this dissertation is my original work except where 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.

Lazarus Masunungure  15/04/22

Student's Full Name Student's Signature (Date)

Dr. Kudzai Mukumbi  11/4/2022

Main Supervisor's Full Name Main Supervisor's Signature (Date)

Copyright

No part of the dissertation may be reproduced, stored in any retrievable system, or transmitted in any form or by any means for scholarly purposes without prior written permission from the author or Africa University on behalf of the scholar.

Acknowledgements

Firstly, I would like to honour God for affording me this opportunity, for the knowledge, wisdom, perseverance and heart to be able to train in this scientific field and to be able to complete this study.

I wish to acknowledge my supervisors Prof L. Dube and Dr. K. Mukumbi for their diverse contributions and inspiring advice from the onset of this scientific study until the very end of the study. Special thanks to my colleagues of the Africa University MSc Agribusiness class of 2021.

A special thank you to Major Family Savings Group Private Limited, for affording me the opportunity to study using some of their resources, special mention to my superiors Mr A. Choga and Mr M. Shadaya for allowing me this adventure in my academic life.

I wish to acknowledge the special efforts by the farmers in Mutasa District who took time away from their busy schedules to attend to my questionnaires and help to bring the much needed resource building up to the structure of this thesis.

Dedication

This work is dedicated to my three sons Panashe; Jonathan; Malachi and my precious daughter Michaela. There were numerous nights I arrived home late studying, the weekends away that we could have spent together, this is the fruit of your sacrifice guys, I love you and was inspired to work harder just so you could also learn that with dedication and passion, nothing is impossible.

Special mention goes to my mum in-law; you took care of me each weekend from the onset of the study until my first year of study. Thank you mum, I pray God grants you your every desire for your efforts and love.

List of Acronyms and Abbreviations

AD	Agro-input Distributor
AGRITEX	Agricultural, Technical and Extension Services
AGRA	Alliance for a Green Revolution in Africa
AUREC	Africa University Research Ethics Committee
COMESA	Common Market for Eastern and Southern Africa
DFID	Department for International Development
FAO	Food and Agriculture Organisation for the United Nations
GDP	Gross Domestic Product
GM	Gross Margin
IFAD	International Fund for Agriculture Development
IFDC	International Fertilizer Development Centre
KASP	Kenya Agro-dealer Strengthening Program
NGO	Non-Governmental Organization
RARP	Rural Agriculture Revitalization Programme
RDC	Rural District Council
SMEs	Small and Medium Enterprises
SNV	Netherlands Development Organization
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
TCE	Total Cost Economics
TR	Total Revenue
TVC	Total Variable Cost
USAID	United States Agency for International Development
ZFU	Zimbabwe Farmers Union
ZIMSTAT	Zimbabwe Statistical Agency

Definition of Key Terms

Agro-input distributor are input dealers as sellers of agricultural inputs that include seeds, fertilizers, crop protection chemicals, farm equipment and machinery, veterinary products and animal feeds.

Productivity is yield per area planted.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1 INTRODUCTION

1.1 Introduction

Agric Survey (2019) states that, agriculture in Zimbabwe occupies a central place in the economy for employment, incomes, poverty and malnutrition reduction. Some 18 percent of Gross Domestic Product (GDP), 23 percent to total formal employment and providing livelihoods to approximately 70 percent of the rural population (54 percent of which are women).The Ministry of Agriculture (2018) noted that 15 out of 31 industry clusters in Zimbabwe depend on agriculture for feed stock. Agriculture-related employment supports a third of formal labour force, (Agric Survey, 2019). The potential for growth of the agriculture sector is huge and can even increase contribution to the GDP resulting in growth and sustainability in food supply to the nation and reduction of poverty through increased return on inputs produced.

The greatest challenge of the agriculture sector in Zimbabwe is low productivity, (Zimstat, 2017). According to Zimstat (2017), agriculture sector performance has been severely hampered over the years by lack of agricultural inputs,, high input costs, recurrent droughts, ignorance to soil potential hydrogen (pH), vulnerability to climatic changes (extreme weather conditions), shortages of financing due to perceived high risks, costs of borrowing and limited public expenditure on known drivers of agriculture growth such as extension services, irrigation, feeder roads ,research and development.

In Mutasa District, Manicaland, small-scale farmers mainly produce sugar bean and banana crops for subsistence and market. Mutasa District is in mountainous area and

because the area has not received notable infrastructure service in recent years, the road networks range from poor to inaccessible. Most agro-inputs dealers are not willing to either have business units in such environments or travel those bad roads for ease of access of inputs to the farmer. Farmers travel distances to access required inputs and commuters usually charge high unit costs per bulk input for instance, fertilizer bag, seed bag contributing to higher costs per planted area resulting in low productivity.

In response, development agents, donors and foreign aid in recent years called for capacity building of the smallholders and agribusiness partners at central and local levels as a way of empowering targeted beneficiaries in turn fostering local development. Maunze (2012) stated that, the government and development agencies have tried numerous approaches to solve the problem of farm inputs shortages of smallholder farmers, unfortunately, all other programs lacked sustainability. Programs like Operation Maguta, small grains input scheme by LEAD Trust and most recently, Command Agriculture, have helped smallholder farmers to access inputs but these are usually not target specific and may neglect key inputs necessary for the crop productivity of a particular area. Development investments and interventions of any kind can only be successful in the long term if both the targeted group(s) for which benefits are intended and the key actors/ groups involved in providing related goods and services have the individual and collective capacity to sustain the gains on their own, over time (Netherlands Development Organization-SNV 2016).

Limited access to necessary agro-inputs has been the cause of low agricultural productivity and the overall poor economic growth and development in most parts of Sub-Saharan Africa (Sanchez and Jama, 2002). Chianu (2002) and Ayieko (2006) both concur that agro-input dealers play a vital role in guaranteeing that farmers have access to some of the essential agricultural inputs that contribute to boosting agricultural productivity. Agro-dealers have potential to drive development efforts in the rural areas especially beyond the efforts of government input subsidies, development aid, donor and foreign aid agencies, by being the pivotal point bringing smallholder development through capacity building efforts that will result in boosts in productivity.

It is the purpose of this study to bring to light the impact of an agro-dealer's input distribution system on sugar bean farmers' productivity in Mutasa District, Manicaland.

1.2 Background to the Study

In 2006, the plight of African farmers was highlighted when the African policymakers met during the Africa fertilizer summit held in Abuja, Nigeria in June 2006 (IFAD, 2006; IFDC, 2010). The meeting highlighted the gaps in agricultural productivity caused by limited use of agricultural inputs (Etyang, 2013). From the meeting and subsequent follow up summits, the role of agro-inputs dealers and agro-inputs business started receiving serious attention both in agricultural development discussions and in policy (COMESA, 2009). This led to numerous interventions targeted at shifting the traditional government subsidy inputs and donor-humanitarian aid inputs supply solutions to market led production value chains aimed at bringing development and productivity to smallholders (SNV, 2016).

In 2009, SNV (Netherlands Development Organization) contracted by Food and Agriculture Organization of the United Nations (FAO) to test and implement an innovative approach to resuscitating rural markets for agricultural inputs. This resulted in a program named Rural Agro-dealer Restocking Program (RARP) a pilot designed to test the appropriateness of market-driven input distribution methods in emerging economic environments (SNV, 2016).

The main aim of these inventions was to foster capacity building through crop production value chains that drive collaborative efforts from stakeholders who target smallholder development and productivity. Tobacco and Cotton value chains had already proved that with support, smallholder farmers were capable of anchoring and growing a sector (SNV, 2016). Similar interventions were introduced in Manicaland such as the Department For International Development (DFID) funded Livelihoods and Food Security Program (LFSP), ENSURE in collaboration with World Vision targeting capacity building of smallholder farmers and actors in the value chain (SNV, 2016). Capacity building of agro-dealers and other value chain actors was mainly to boost confidence in targeted crop producer groups, cooperatives, and individual smallholders, hence forming strong partnerships and collaborations (SNV, 2016).

However, smallholders have a challenge of failing to separate government subsidies, developmental/humanitarian aid from market led value chains, hence most interventions gradually fail to grow beyond the development program. Thus for smallholders to sustain the development programs beyond the introduction of these programs, there is need for policy makers to find a key driver of such an intervention within the set value chain partners that will see to it that smallholders continue to adopt practices introduced by

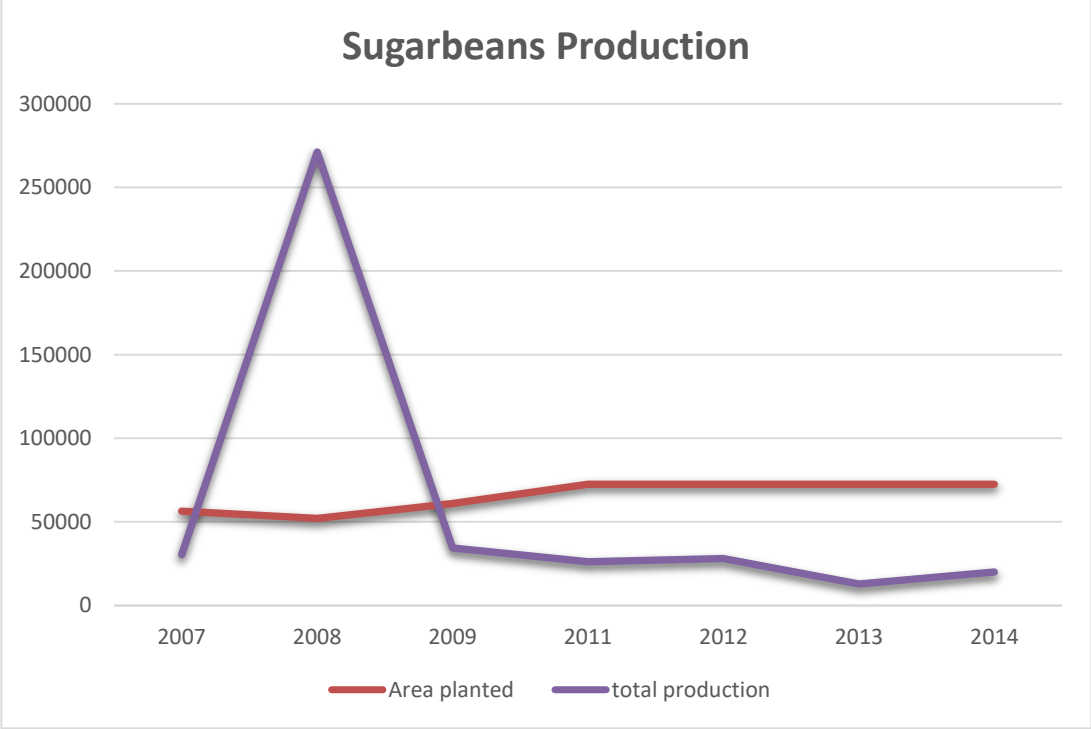
development agencies. Agro-dealers have potential to play such a pivotal role in being the anchor, driving the value chain collaborations for the benefit of not only agribusiness partners, but also largely bringing productivity to the smallholder and his community.

In 2015, the DFID funded RARP intervention contracted to LFSP in Mutasa District, aiming for capacity building of agro-dealers and value chain actors in the same vein building confidence in targeted crop producer groups, cooperatives and individual smallholders. Sugar beans was one of the targeted crops promoted by LFSP through contract farming (CF) value chain players. This brought agribusiness synergies between, agro-dealers such as Major Family Savings Group (MFS); Micro-finance Institutions such as Microplan (FBC Bank), Virl Finance, Lion Finance; Agritex Extension; output markets or produce off-takers such as Cairns foods, Associated Foods Zimbabwe (AFZ), Zimbabwe Super Seeds (ZSS) and the smallholder producer/farmer groups at community level. Sugar beans is a worldwide cultivated legume and in Zimbabwe, particularly in Mutasa District, the crop was mainly being promoted for smallholder producer production by LFSP for its high protein sources to counter malnutrition concerns in the District. Sugar beans production would be ideal for the smallholders as it provided solutions for food security and nutrition as well as being a cash crop increasing household incomes.

Agric Survey (2019) analysed the production of sugar beans as follows; in 2007, 2008, 2009 Zimbabwe had sugar beans outputs of 30,300 metric tonnes (mt), 27,150mt, 34,400 mt respectively with area under production being 56,300 hectares (ha), 52,070 ha, 60,900 ha in those years. Ironically, area under sugar bean production shot up to an average area of 72,500 ha, for years between 2011 and 2014 (inclusive) but production levels fell by

26,220 mt, 28,000 mt 12,840 mt and 20,110 mt in 2011 to 2014 respectively (Agric survey, 2019).

Figure 1.1 Sugar bean production analysis 2007-2014



The analysis on figure 1.1 shows farmers reducing area under sugar bean production between the given dates. Farmers on initiated programs could attribute this to poor take on strategies from development partners. During the development partner's aid, farmers will thrive in production, as the value chains are complete and well managed. As soon as

the development partners close the aid, agribusiness partners are not setting collaborative synergies that will sustain the initiations set by developing aid organisations.

This study undertook an impact assessment of these SNV, DFID, LFSP interventions in Mutasa District, Manicaland Province with particular focus on the impact of an agro-dealer's input distribution system on smallholder sugar bean farmers productivity especially beyond the initiation phase of the development agencies. Agro-dealer's input distribution system seeks to bring to light the possible value chain linkages that can foster development for the community partners and bring productivity to the farmers.

1.3 **Statement of the Problem**

In most parts of Sub Saharan Africa (SSA), a lack of access to necessary agro-inputs contributes to low agricultural productivity and slows the overall economic growth and development (Etyang et al., 2014). Maunze (2012) noted that Zimbabwe's agro-inputs supply chain collapsed during a decade long economic recession that started in 2000 with smallholder farmers in rural areas being the worst affected groups failing to access the right agro-inputs locally at competitive prices and at the right time.

Government and development agencies have introduced numerous interventions in rural communities across Mutasa District but these seem to propel a donor syndrome that has killed the activation of agro-dealer input distribution systems in the district. Olomola (2014) noted that, the general trend at the present moment is that most rural based agro-dealers become active only when there is a donor funded program distributing subsidized

inputs to smallholder farmers through them, and are dormant outside donor funded input supply programs. Sustainability of the interventions is thus a problem.

The impact of rural agro-dealer input distribution systems in Zimbabwe, particularly in Mutasa District has not been explored to discover the significance of their influence on productivity of smallholder farmers. This study sought to assess the impact of an agro-dealer's input distribution system in improving sugar bean smallholder farmers' productivity at local and community level in Mutasa District.

1.4 Research Objectives

The overall objective of the study was to identify the tactics employed by an agro-dealer in their input distribution system to influence farmers' adoption of inputs in their production of sugar beans to improve yields per area planted.

Specific Objectives of the study were:

1. To identify challenges faced by smallholder sugar beans farmers in accessing agro-inputs in Mutasa District.
2. To determine the factors influencing sugar-bean production productivity in Mutasa District.
3. To determine the impact of agro-dealer input distribution system on returns to crop productivity to smallholder sugar bean farmers of Mutasa District, and
4. To identify opportunities that exist for agro-dealers through the input distribution system in Mutasa District.

1.5 Research Questions

1. What are the challenges faced by smallholder sugar beans farmers in accessing agro-inputs in Mutasa District?
2. What factors influence sugar-bean production productivity in Mutasa District?
3. What is the impact of agro-dealer's input distribution system on productivity of sugar-bean farmers in Mutasa District, and
4. Are there any opportunities that exist for agro-dealers in adopting the agro-dealer's input distribution system in Mutasa District?

1.6 Significance of the Study

There is information asymmetry on the role agro-dealers can play in being the key driver of collaborative agribusiness value chain partnerships especially at community level that fosters sustainable profitability and productivity to players and smallholder farmers. In Zimbabwe, particularly in Mutasa District, such a study has never been explored. This research sought to answer questions related to whether agro-dealer input distribution systems could improve smallholder access to affordable, quality agricultural inputs, delivered on time and in a sustainable manner. A detailed analysis of factors influencing sustainable agro-dealer's input distribution and its contribution to sugar bean smallholder's productivity in Mutasa District should help policy makers in pursuing interventions that place agro-dealers as key drivers of sustainable market driven value chains at community level. The research filled the information gap in the body of knowledge on the potential roles agro-input dealers can play in rural communities and

brought to light opportunities that are available for agribusiness players keen on bringing sustained development to rural communities.

1.7 Delimitation of the Study

Delimitation is the sample population chosen. The study targeted small-scale sugar bean farmers of Mutasa District in Manicaland Province of Zimbabwe and not the whole country. The study aimed at measuring the impact of agro-input distribution system on productivity of smallholder sugar bean farmers of Mutasa District.

1.8 Limitations of the Study

Mutasa area under study is mountainous, poor road networks, hence accessibility was one of the major limitations of this research. Covid 19 pandemic travel restrictions issued by the government to mitigate the spread of the pandemic made accessibility a challenge. To access wards 15-Murindiko, 16- Mount Jenya, 19- Moyoweshumba, and 20- Mapara, Mutasa District Extension Head Officer had to approve this movement first before I could begin the study in these wards. Most offices were on forced shutdown and office personnel were mostly working from home. To get this approval took more time hence delaying the commencement of the study. In wards 15-Murindiko and 16-Mount Jenya, the major dirt-road networks are 1.5 kilometres up to 2.5 kilometres from the households that were selected for the study sample. The researcher had to walk the mountainous area to access these households. A small sample of the population was interviewed because of these limitations. The smallholder farmer households targeted in this study were those involved in sugar bean cultivation. The study can be generalized to other areas with similar agro-ecological characteristics as Mutasa District.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter gives a brief background on agro-input distribution systems in Africa and in Zimbabwe as relevant to the study. The following sub-headings will be under review: theoretical framework, relevance of theoretical framework to the study, empirical studies and conceptual framework. This chapter will highlight the impact of an agro-dealer's input distribution system on productivity of sugar bean smallholder farmers as cited in related literature. General overview of the agro-input systems in Africa and Zimbabwe are discussed together with the explanation on agro-input distribution system in Zimbabwe. A brief discussion on previous studies done in other countries and in Zimbabwe and the information gap to be covered shall be shown in this study.

2.2 Theoretical Framework

Key to this study is the sustainable impact of an agro-dealer's input distribution system in Zimbabwe particularly on aiding productivity of sugar bean smallholder farmers. A few theories were of use in this study regardless of the few publications on the subject under study. The researcher chose a combination of the transaction cost economics (TCE) and the relational theory as relevant underpinnings of the study.

2.2.1 Understanding Transaction Cost Economic Theory and Relational theory

Transaction Cost Economics (TCE) theory largely deals with the organization of exchange that occurs outside the market, and thus appears to have potential to form the basis for developing innovative economic theories more applicable to new social and economic

governance structures designed to alleviate the problems of market mechanism (O'Donnell, 2009). Williamson (1996) defines Transaction cost theory (governance structures) as, 'the institutional matrix within which transactions are negotiated and executed'. Hence, supply chain governance refers to the institutional framework in the supply chain where transactions are carried out, (Zhang & Aramyan, 2009). They concur that, in order to understand the supply chain governance, there is need to touch on an important theory TCE. TCE is deeply rooted in two recent fields of research, new institutional economics and economics of organization (Williamson, 1991, 1993a, b, 1998). Based on Williamson's (1991) polar concept, governance structure can be viewed as a continuum. At one extreme lies spot markets, where transactions are sorely determined by prices, while at the other end lies full vertical integration, (Zhang *et al*., 2009). In between these two extremes lie various hybrid forms of governing economy activities, such as contracts, strategic alliances, joint ventures (Zhang *et al*., 2009).

TCE has recognized that the productivity of a value chain is a function of both production costs and transaction costs (Dyer *et al*., 2003). Transaction costs determine the governance structure of a supply chain (Bremen *et al*., 2010). TCE theory is criticized for its simplicity since it ignores the informal, socially embedded relationships in producing stable contract conditions (Demsetz, 1988; Ring & Van den Ver, 1992, 1994). In response, relational exchange aspects look at the soft, normative and informal side of the relationships between farmers and their agribusiness actors (Zhang & Aramyan, 2009). Relational transaction (bilateral and/or unified governance) is defined as recurrent transactions that are completed based on long-term relationships between two parties with mixed or idiosyncratic specific investments, (Zhang *et al*., 2009). They both concur therefore that;

contractual (TCE) and relational governance are two major business relationship governance forms.

In Macneil (2000)'s Relational contracting theory, the concept of contract refers to relationships between people who share norms and values and trust is a key feature in this relational governance, (Zhang *et al*., 2009).

This study focused on the impact of an agro-dealer's input distribution system on sugar bean smallholder farmers' productivity, thus an in depth study of the supply chain governance especially from the two dimensions; contractual governance and relational governance was key. Zhang *et al*., (2009) defines contractual governance as any agreements (written or oral) reached by parties to reduce risk and uncertainty in exchange relationships. In their case study of China, they specify two types of contracts, that are marketing contracts and production contracts. Marketing contracts define buying and selling conditions for the products while production contracts describe more details for the production process (Zhang *et al*., 2009). According to Zhang *et al*., (2009), relational governance refers to parties' informal embedded relationships and social norms. They posit that, relational governance can be approached from two facets: trust and cooperative norms. Empirical research shows that relational governance is associated with trust (Gulati, 1995; Zaheer & Venkatraman, 1995; Dyer & Singh, 1998). Cooperative norms are the shared beliefs and expectations of two parties that they must work together to achieve mutual goals (Baker *et al*., 1999; Cannon & Perreault, 1999).

2.2.2 Relationships between contractual governance and relational governance

Researchers have been studying the relationships between contractual and relational governance (Yu *et al*., 2006) Ferguson *et al*., (2005) observed that relational governance was the predominant governance mechanism associated with exchange performance. Contractual governance was also positively associated, but to a much lesser extent (Zhang *et al*., 2009). There are compelling arguments for a substitutive relationship between these two governance mechanisms (Dyer & Singh, 1998; Gulati, 1995). Gulati (1995) even claimed that, 'Cautious contracting gives way to looser practices as partner firms build confidence in each other' Yu *et al*., (2006) found that both formal governance (contractual agreements and financial commitments) and relational governance (trust) mechanisms affects suppliers' tendencies to make specialized investments. They argued that, as firms built up more calculative trust, their partners reduce the dependence on formal governance mechanisms. However, the empirical study from Poppo and Zenger (2002) supported the proposition that formal contracts and relational governance function as complements. These two may coexist and interact with each other (Zhang *et al*., 2009).

2.2.3 Relationships between value chain performance and governance structures

Research on performance of supply chain has proven to be difficult task and though various studies have been devoted to performance, the topic remains controversial (Zhang *et al*., 2009). Various performance indicators have been used to characterize supply chains, ranging from qualitative indicators like customer or employee satisfaction to quantitative indicators like return on investments/productivity (Zhang *et al*., 2009). This large number of different performance indicators, and the lack of consensus on what

determines performance of supply chains, complicates the selection of performance measures (Aramyan *et al*., 2006). The debate rises from the fact that performance can be defined and evaluated in several ways, and few definitions and indicators of performance are widely accepted (Claro, 2004). Furthermore, combining these indicators into one measurement system proves to be difficult (Zhang *et al*., 2009).

Performance indicators are of vital importance to continuity (sustainability) of value chains and networks (Zhang *et al*., 2009). They agree that, insufficient scores on these performance measures might lead to sustainability problems in the short and long-term. To ensure sustainability it is imperative to work efficiently and minimize costs chain-wide (Zhang *et al*., 2009). They note that, in the long-term production and consumption chains will have to approach the efficiency frontier in order to survive. Beside costs associated with production, a value chain (VC) is faced with information costs (costs associated with information exchange between VC members), inventory carrying costs (costs associated with carrying a quantity of stored inventory; capital costs, inventory service costs, storage space costs and inventory risk costs), physical flow costs (costs of distribution), and transaction costs (costs associated with transactions between VC members) (LaLonde & Pohlen, 1996). These costs have both fixed and variable characteristics and should be taken into account in measuring performance (Zhang *et al*., 2009).

There is less agreement on the matter of what performance measurement system should be like (Zhang *et al*., 2009). According to Bunte *et al*., (1998) performance indicators should relate to both effectiveness (to what extent is output met) and efficiency of the value chain and its actors (input-output ratio compared to a target). Van der Vorst (2000) makes a slightly different distinction: utilization (actual input/norm input), productivity

(actual output/actual input), and effectiveness (actual output/norm output). Beamon (1999) suggests a system of three dimensions: resources, efficiency of operations, output (high level of customer service) and flexibility (ability to respond to changing environment).

Lu (2007a, b) proposed a model to analyse governance mechanisms that support market performance in Chinese vegetable supply chains. In his model, Lu used three performance indicators, which are efficiency, quality/price satisfaction, and profitability. Han *et al*., (2006) conducted a study that explored the links between vertical integration, quality management and firm performance within the framework of transaction cost analysis using data from Chinese pork industry. As performance indicators, authors used growth rate, market share, profitability and productivity (Zhang *et al*., 2009). Claro *et al*., (2003) built an integrated framework for Dutch potted plants and flower production that aimed at the combination of constructs on the transaction, dyadic and business environment level for testing their impact on relational governance and performance. As performance indicators, the sales growth rate, profitability and perceived satisfaction have been used (Zhang *et al*., 2009). The impact of flexibility on two financial performance indicators has been assessed (Zhang *et al*., 2009).

Combining the aforementioned works and taking into consideration their case study in supply chain in agri-foods in China, Zhang *et al*., (2009) proposed the following set of performance indicators:

- *Efficiency*. Final product price, profitability (value added), sales growth.
- *Flexibilit*y. Volume flexibility, delivery flexibility.

- *Quality*. Customer satisfaction with product quality.

Formal contracts are mechanisms that attempt to mitigate risk and uncertainty in exchange relationships (Lusch & Brown, 1996). However, strict adherence to the written contract may disturb the necessary flexibility in transactional exchange (Ferguson *et al*., 2005). Exchange performance can suffer when detailed contracts are used without a well-developed social relationship (Cannon *et al*., 2000), and may create opposing conflicts that could eventually harm channel member flexibility, thus performance (Lusch & Brown, 1996). When social relationships are well developed and partners trust each other, a higher level of flexibility and tolerance is found than in relationships with lower trust (Morgan & Hunt, 1994). Consequently, the buyers that trust their partners will be more willing to react flexibly to changing environment or demands of the partner (Claro, 2004). Based on this, Zhang *et al*., (2009) hypothesized that, the higher the level of trust between small-scale farmers, and their buyers, the higher the level of flexibility.

According to Macneil (1987), formal contracts represent promises and obligations to perform particular action in the future. Contracts may specify the quality obligations of the products as well (for example, compliance with certain standards, monitoring, penalties). Therefore, with contractual governance, transaction partners could be highly motivated to comply with the quality arrangements specified in the contracts, since in case of not complying with these arrangements may result in terminating the contract and losing a transaction partner (Zhang *et al*., 2009).

According to Ganesan (1994), trusting partners have strong desire to continue the relationship. However, the duration of the relationship is related to the fulfilment of mutual requirements regarding quality arrangements (Lu, 2007a, b). Based on this, Zhang

et al. (2009) posit that, the higher the level of contractual governance the higher the level of product quality due to high compliance with quality requirements. They conclude that, the higher the level of trust, the higher the level of product quality.

Trust can reduce negotiation costs (Zhang *et al*., 2009). Negotiations are less costly under conditions of higher inter-organizational trust, because agreements are reached more quickly and easily as the trust mitigates the information asymmetries by allowing more open and honest sharing of information (Zaheer & Venkatraman, 1995). Therefore, the higher the trust the lower the negotiation costs (Zhang *et al*. 2009). Zaheer *et al*. 1995) proposed that exchange performance (i.e. suppliers' fulfilment of buyer's requirements in terms of price, delivery time, quality and flexibility) is lowered when negotiation costs are high due to the time and energy spent for negotiations. Consequently, when there is trust between partners and negotiation costs are low, performance will tend to increase (Zhang *et al*. 2009).

Morgan and Hunt (1994) listed arguments why trust enhances efficiency, productivity, and effectiveness. These arguments are:

- Transaction partners work at preserving relationship by cooperating with transaction partners;
- Resist attractive short-term alternatives in favor of expected long-term benefits of staying with current partners; and
- View potentially high-risk actions as being prudent, because of the belief that their partners will not act opportunistically

Sako (1992) argues that trust contributes towards enhancing efficiency, because:

- It stipulates the flow of truthful information which might otherwise be distorted by opportunistic behaviour, which in its turn may improve efficiency;
- Monitoring costs are low because trust enables abolishing the quality inspection on delivery, so costs of enforcement ensures that promises are fulfilled without actual use of external sanctions; and
- Costs of quantity and price negotiations are low because of mutual open disclosure of information concerning future business plans and costs.

Based on this, Zhang *et al*., (2009) agree that the higher the level of trust the higher the level of efficiency.

2.3 Relevance of Theoretical framework to the study

Theories stated above relate to efficiency, flexibility and quality of a supply chain or agro-dealer's input distribution system in increasing productivity of producers in the value chain, for our case being the smallholder sugar-bean farmers. The study focused on the impact of an agro-dealer's input distribution system on sugar bean smallholder farmers' productivity. The theories therefore attempt to relate how agro-input distribution systems can efficiently, flexibly and with quality increase productivity of smallholder sugar-bean farmers by employing these theories. The theories are thus relevant to this study as they relate to how an agro-dealer's input distribution systems can be structured if they are to increase sugar bean smallholder farmers productivity in a sustainable manner.

Transaction cost economics (TCE) theory and the relational theories were combined to address value chain or agro-input distribution system challenges that have led to missed

opportunities in new technology adoption which contributes to improved yields per area planted (productivity) in most parts of SSA particularly in Mutasa District of Zimbabwe. TCE and relational theories helps the agro-input distribution system to

Zhang and Aramyan (2009) in their study on supply chain governance in Chinese Agri-foods value chains argued that, most agri-foods value chains, according to reviewed literature, tries to answer questions on how best to integrate small-scale farmers into agri-foods value chains. They maintain that most studies on this topic focus on Contract farming (CF) as a solution, while limited research touches upon issues of trust and relations. Thus, Zhang and Aramyan (2009) concur that both CF and relationships are seldom addressed. Zhang and Aramyan (2009) evaluated a novel Conceptual concept of two-dimensional governance structure in the agri-foods value chains, where Transaction Cost Economics Theory (TCE) and Relational theory combine to study the governance relationships between small-scale farmers in China and their agribusiness actors.

This study adopted this Conceptual concept to evaluate the agro-dealer's input distribution system as a key driver of capacity building an agribusiness actors value chain that fosters not only technology adoption, but results in productivity for the small-scale farmer. The aim was to use an agro-dealer's input distribution system to encourage community based capacity building using contractual and relational governance. The TCE and Relational theories combined were thus relevant to this study as they bring out sustainable productivity to an agro-input distribution system through employing efficient, flexible and quality performance measures.

2.4 Review of Empirical Studies

Sub-Saharan Africa (SSA) agricultural growth is lagging behind compared to the population growth in the region (FAO, 2008). The slow growth in the use of modern agriculture inputs in the farming systems of the SSA has resulted in missed opportunities to increase Africa's agricultural production, productivity, household incomes and welfare (Chianu *et al*., 2008). Some of the constraints to rapid agricultural technology adoption in smallholder farmers include factors such as lack of credit, limited access to information, risk aversion, small and fragmented land holding, inadequate incentives associated with tenure arrangements, insufficient human capital, absence of equipment that affects timelines of production, untimely supply of inputs and inappropriate transportation infrastructure among others (Feder *et al*., 1985).

The International Finance Corporation (IFC), (2016) a member of the World Bank Group, in its report on, 'Investing in Women along Agribusiness value chains indicated that, small scale farmers face challenges that slow down production and productivity. These include secured access to inputs and input financing; lack of market information and access; out-migration of farm workers from rural to urban areas; aging farming communities and increased demand for food products from growing emerging markets. These challenges require efficient and sustainable agricultural solutions, which agribusiness lead firms need to ensure for the sustainability of their supply chains (IFC, 2016).

Adoption of improved agriculture technologies is fundamental to the transformation of sustainable farming systems and a driving force for increasing agricultural productivity (Osei, Osei-Akoto, Fenny & Hodey, 2018). Use of agricultural inputs by smallholder

farmers is still below average. Between 1980 and 2000, consumption of fertilizers in the SSA region has declined, following a brief increase in 1988 and 1989, (Osei *et al*., 2018). Currently, fertilizer use per hectare of arable land has remained largely unchanged between 2002 and 2014 (Osei *et al*., 2018). They observed that fertilizer consumption levels for the region fall below global averages (138 kilograms per hectare) about nine times less, and for Niger, fertilizer uses averages 1.07 kilograms per hectare even lower than SSA figures (15.9kilograms per hectare).

Literature shows that the problem is particularly acute in Niger, where input supply systems are largely inefficient (Osei *et al*., 2018). Good quality inputs are neither available at the right time nor affordable for smallholder farmers to assume agricultural intensification using inputs (Osei *et al*., 2018). In Niger, for instance, only 12% of the agricultural land area is cultivated using improved seeds, fertilizer use remains as low as 1.1 kilograms per hectare of arable land compared to already low West African average of about 16 kilograms per hectare of arable land (World Bank, 2016). Various factors have accounted for the particularly low usage of inputs in Niger, one such factor is the absence of inputs distributors with a degree of professionalism, particularly in the rural areas (Osei *et al*., 2018). Secondly, there is limited access to credit and information on input markets, finally, farmer organizations are generally weak and thus unable to mobilize and overcome some of the bottlenecks that farmers face (Osei *et al*., 2018).

Several interventions intended to improve farmers' access to agricultural inputs. In order to address some of the constraints that relate farmers access to inputs, Contribution a L'Education DE Base (CEB) with the support of the Alliance for a Green Revolution in Africa (AGRA) implemented a project that sought to reinforce agro-dealers networks in

Niger (Osei *et al*., 2018). Overall goal of the intervention was to improve smallholder farmers' access to and adoption of agricultural inputs (Osei *et al*., 2018). Expected outcome of the intervention was for an improvement in the supply of agricultural inputs such as fertilizers, seeds, pesticides, and subsequently lead to an increase in the use of inputs (Osei *et al*., 2018). Their study undertook an impact assessment of this CEB intervention in Niger by analysing the impact of the CEB training program on two sets of smallholder farmers, residing in villages served by agro-dealers who received either training only or training with a demonstration plot (Osei *et al*., 2018). Based on a stipulated theory of change, comparisons on the changes in key impact and outcome indicators experienced by the groups to that of farmers contained in a control group, who received neither treatment at the time of study.

There are problems associated with the dissemination and communication of information to farmers (Rege, 200; Rees, 2000). The gaps in dissemination and communication of information in the agribusiness value chains at rural or community levels are mainly because the government and donors have left this duty to extension services agents who are trusted to serve as the link between farmers and the scientific community (SNV, 2016). The extension service agents are nonetheless resource incapacitated with the extension officer to farmer ratios continuously growing at ward/community levels.

This is evidence enough to show that there is need for policy makers to identify a key driver among the community value chain actors to act as the hub of disseminating and communicating information to other actors particularly smallholder farmers.

Recent efforts to improve access to information targeted agro-inputs dealers, and these efforts aim at making agro-inputs dealers' hubs for agricultural information that can help

farmers in their production decisions (Etyang, 2013). ASFG (2010) maintains that policies need to pay stronger attention to the crucial role that self-mobilisation can play in fostering agricultural development. They note that, farmer and community organisations can act as vehicles in disseminating new technologies, knowledge, resources and used as springboards for other community development activities. It is from this initiative that agro-dealers can be effectively essential in being the key player in building linkages for farmer and other community organisations for information dissemination.

2.5 Understanding agro-input distribution systems in Africa.

Etyang (2013) defines Agro input dealers as sellers of agricultural inputs that include seeds, fertilizers, crop protection chemicals, farm equipment and machinery, veterinary products and animal feeds. Agro-inputs dealers play a major role in ensuring that farmers access some of the important agric-inputs required to improve agricultural productivity in their respective farms (Poulisse, 2007). Nevertheless, the contribution of agro-inputs dealers in agriculture development in SSA have been largely neglected (IFDC, 2003).

In Kenya the efforts to tap the potential provided by agro-dealers spearheaded by AGRA and the government through Kenya Agro-dealer Strengthening Program KASP (AGRA, 2009). The initiative has provided training in business management and improved farming methods (AGRA, 2009). The trainings have enabled agro-inputs dealers to provide inputs and share knowledge on improved production practices with smallholders (CNFA, 2009). The government of Zimbabwe and the donor community recognised that it was strategic to prioritize interventions that could spearhead the resuscitation of a sustainable market driven input supply system (SNV, 2010). A decision to deliberately move from a free

input distribution system, which was fuelling the dependency syndrome, to a more sustainable and market driven system (SNV, 2010).

For our case, the input-distributor or agro-dealer is an agribusiness lead firm distributing inputs from the input manufacturers and a key player in the supply value-chain. This agro-input distributor has backward integrated from town centres to rural/community centres targeting farming areas that are hubs for agricultural production such as Mutasa District. For the purposes of this study, the agro-dealer chosen has two business units (Watsomba and Hauna) in Mutasa, but focus was on the business unit in Watsomba business centre. The agro-dealer chosen was Major Family Savings Group (MFS Group) Agro-input dealer offers services like free extension trainings on old and new crop protection and animal health chemicals, their safe and efficient applications, offers free delivery to bulk orders thus encouraging collaborative buying, and links farmers to output markets. The system offers guaranteed market to producers, an incentive to re-use agro-inputs for subsequent seasons (IFDC, 2015).

It is commonly perceived that private traders and input suppliers tend to locate and confine their businesses close to towns and market hubs where infrastructure is relatively well developed (Olwande & Mathenge, 2010). Therefore, farmers living in areas that are more rural are largely cut off from input markets and extension services, which ultimately affect both technology adoption and farm productivity negatively (Kwasi, 2018). This agro-input distributor has found gaps in the rural communities that they could exploit to maximize turnover/sales, increasing customer database through provision of inputs at farmers proximity, attracting and encouraging synergies with value chain players who seek to benefit from smallholder production, examples being, micro-finance institutions,

output-market companies, to name but a few. The agro-input distributor employs various tactics including the combined TCE and relational theories to improve smallholder farmers' production efficiency and productivity while maintaining quality.

Few studies have evaluated the impact an agro-dealer would make on smallholders and the community they serve on improving productivity and livelihoods in Zimbabwe. For this reason, this study examined the impact an agro-dealer's input distribution system made on productivity of sugar-beans producing smallholder farmers in Mutasa District, Manicaland Province.

2.6 Understanding Sugar-bean production worldwide.

Sugar beans (*Phaseolus Vulgas*) are a worldwide-cultivated legume that provides a high source of protein, consumed in its immature or mature state. While dry beans are produced for consumption as a grain, green beans are bred and produced for the consumption of the green pods (Wartmann, 2006). Common bean is produced mainly in developing countries where it represents a major source of dietary protein, especially in the absence of animal or fish protein sources.

Sugar bean has a global harvest of 24 million tonnes annually, with Latin America accounting for half that output, with a bean-producing region of 8 million hectare, raised mostly by women for subsistence and market (CIAT, 2005). In South Africa, 42,200 ha of sugar beans produced an estimated 63,560 tons in 2008 (DPO, 2008). In Zimbabwe, a review of Provincial contribution to national output shows that Manicaland province accounted for 36 percent of the sugar beans produced in 2018 with leading producing districts being Nyanga and Mutasa (Agric survey, 2019).

It was for this reason that the researcher investigated the impact of an agro-dealer's input distribution system on sugar bean-producing smallholders' productivity in Mutasa rural District area of Manicaland, Zimbabwe. Hybrid sugar bean seed Nua 45 was considered for the purposes of this research on both beneficiaries and non-beneficiaries of the agro-input distribution system.

2.7 Measuring the Impact of agro-input distribution system on smallholders' productivity.

According to a case study by (Osei *et al*., 2018), they observed that there are no key studies that have evaluated programs geared towards improving agro-dealer efficiency as a way of impacting on input use and consequently yields in Niger. In order to measure these impacts, they employed the theory of change as a suitable strategy for evaluating initiatives.

2.8 Theory of change evaluation

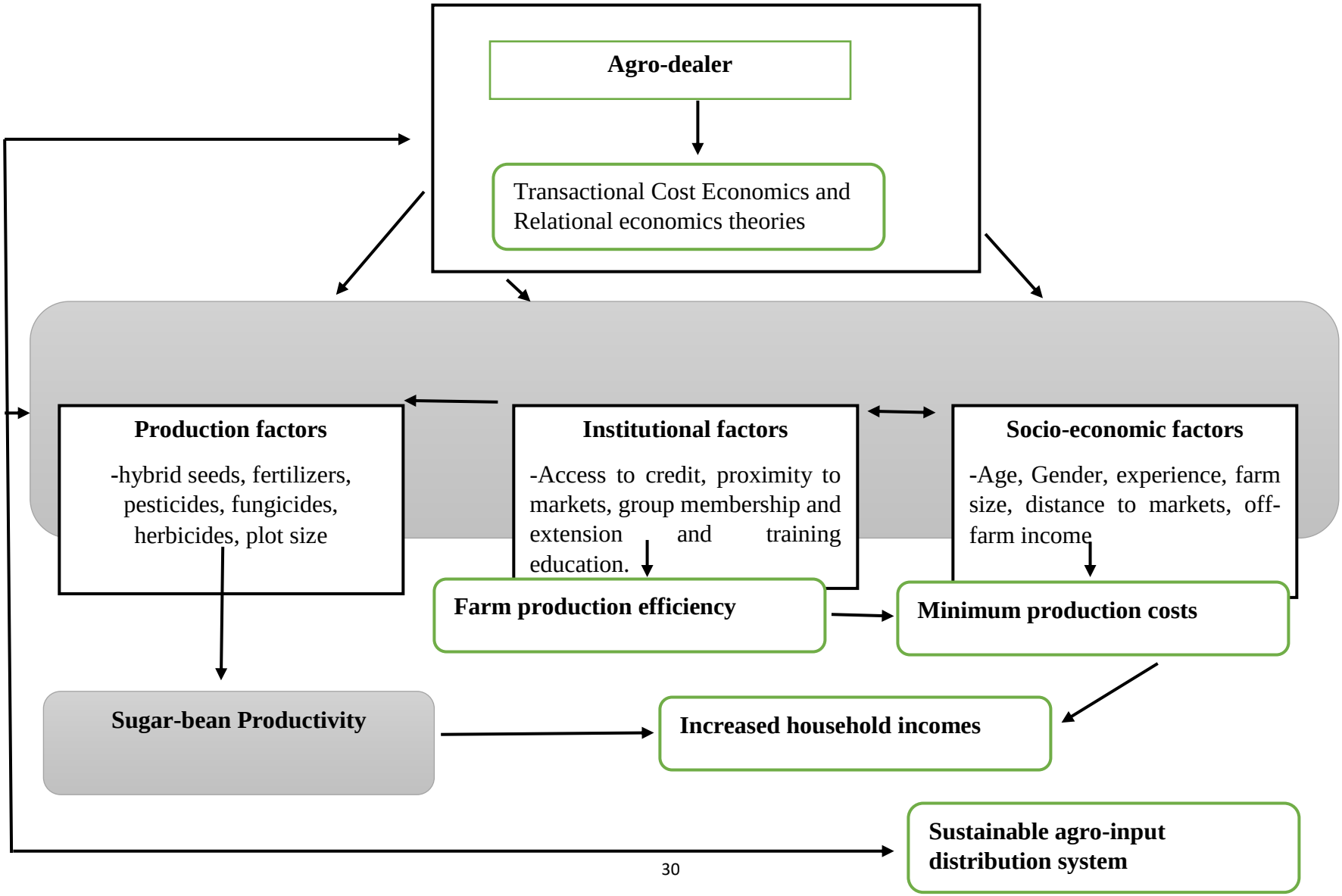
The theory of change model looks at the impact of an initiative through linkages between intervention activities, short term and long-term outcomes, identified prior to its execution (Osei *et al*., 2018). For the purposes of this study, the research adopted this concept to measure impact of agro-input distribution on productivity of smallholders farmers exposed to the concept and those not exposed to the concept. This method, developed in the early 1980s and 1990s was in answer to a need for comprehensive way of evaluating community initiatives than was historically used, the most popular of which was process documentation that simply accounted for the proper administration of intervention as an indicator of successfully changing outcomes (Connel & Kubisch, 1998).

The theory of change model looks at how and why an initiative works, rather than just the successful implementation of the program (Osei *et al*., 2018). It forces evaluators to look at outcomes first and work backwards to identify which changes need to occur first in order to realize the outcome (Clark, Colby, Collins, & Taplin, 2013). The process of developing a theory of change involves the following steps; identifying intended outcomes, creating linkages with inputs that would lead to their realization and agreeing on these linkages and outcomes with key stakeholders (Osei *et al*., 2018). This is to ensure that each component, input and output are measurable, such that causal linkages are tested in an evaluation (Osei *et al*., 2018).For the purpose of this study, adoption of this method was relevant as, in the same vein; the intended outcome of the study is to improve smallholder sugar-bean farmers' productivity through increased yields. In an impact evaluation, the theory of change provides framework to identify the required data, the method of analysis and reporting (Rogers, 2014). Identifying this outcome enabled a backward assessment of intermediate or short-term outcomes that would lead to increased productivity (Osei *et al*., 2018). For this study, adoption of the transactional cost economics theory and relational theory to motivate use of agricultural inputs, chemicals and improved seeds identified as means to improve productivity of smallholder sugar-bean farmers. In creating the theory of change framework, based on these realizations, the evaluation process looked at whether, at the end of the study, concepts employed by the agro-input distributor motivated adoption of agricultural inputs by the farmer, as well as increasing productivity for the farmer.

2.9 Conceptual Framework

A study conceptual framework is by definition, a tool used to make conceptual distinctions and to organize ideas (Bhasera, 2015). Zhang and Aramyan (2009) pointed out that most studies on this topic focus on contract farming as a solution, with relationships seldom used. In order to integrate smallholder farmers into productive agribusiness value chains, adoption of this complimentary relationship between transaction cost economics theory and relational theory is key. In this study the conceptual framework shows how an agro-dealer combines the TCE and Relational concepts to influence an input distribution system that inter-relates various factors to promote sugar-bean productivity of smallholder farmers and hence the sustainability of an efficient agribusiness value chain system.

Figure 2.1: Conceptual Framework



Various sets of factors inter-relate to determine sugar-bean productivity in farming systems. Sugar-bean productivity is the dependent variable whilst a number of production, institutional and socio-economic factors are the covariates explaining variations in productivity of smallholder sugar-bean farmers. Production factors such as access to hybrid sugar bean seeds (Nua 45); fertilizers, chemicals and plot size are key input considerations into the production process. Inputs need to be available in the right pack sizes and their distribution is influenced by the concepts employed by the agro-dealer (in this case the TCE and relational concepts combined), which in turn, determine the level of sugar-bean productivity. The expectation is that, as farmers use more inputs, sugar-bean yields per hectare of land planted, should increase. It is noted that, with chemical and fertilizer inputs, increased usage might not necessarily increase yields, instead might lead to reduced yields if diminishing returns of production are reached. Available farm resources have to be utilized efficiently to achieve highest sugar-bean productivity levels.

The institutional and socio-economic characteristics of a farmer also influence his/her productivity. Institutional factors can influence productivity in the following, proximity to markets, access to credits/ input finance, extension and training education, group membership. Proximity to markets increases access to inputs. Access to input finance provides farmers with funds necessary for farmers to overcome liquidity constraints that at times hinder timely purchase of inputs. Extension and training education equips farmers with information on good agricultural practices (GAPs) and improved technologies that help to improve productivity. Group memberships attract value chain players because of

numbers (economies of scale) for instance, markets, input financiers, input suppliers thus helping to resolve problems linked to market imperfections.

Socio-economic characteristics of the farmer can influence productivity negatively. Older farmers are thought to be risk averse, hence may be late adopters of new agricultural technologies. Gender is hypothesized to have negative relationships with productivity as female farmers face challenges compared to male farmers concerning access to information and resources. Off-farm income is hypothesized to have positive relationship with productivity since farmers with such incomes are more likely able to acquire farm inputs on time. Educated farmers may have mixed results in that, on one hand, farmers may be committed to farming to take up new technologies faster as understanding of benefits attached to this is high; while on the other hand, farmers may be engaged in a number of income generating activities and thus have less time for their farms, thus lowering productivity. Experienced farmers are better producers who have learnt from their mistakes and thus have higher productivity than their less experienced counterparts. Plot size is hypothesized to have a positive influence on productivity, as larger plots are expected to take advantage of economies of scale in their farming operations compared to the smaller farms.

Given that the agro-input distributor provides for these factors, expectation was that smallholder farms will be efficient in their production, as costs are minimized with each factor being effectively availed by the agribusiness players. The smallholder farmer was thus hypothesized to achieve higher returns/yields on their sugar-bean production against inputs injected into the enterprise. The spill over effects were positive on the welfare of the producing households. Improved households welfare provided a feedback effect in

form of increased access to production inputs, repeat sales for the agro-input dealer, value chain players and key information to policy makers on opportunities that can help sustainable linkages of agribusiness players at community level.

2.10 Summary

This chapter evaluated the theoretical framework guiding the study to understand the impact of agro-dealer's input distribution system on sugar bean farmers' productivity. A conceptual framework analysis as a guide to the main terms of the study. The following chapter will look at the research methodology, research design, research tools, data collection instruments and collection procedure used in the study.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter outlines the methods used to answer the research questions. This chapter will also describe the study area, the research design used, data collection approaches and techniques, the type of data collected, and data collection methods, type of analysis done to produce the results.

3.2 Study Area

The study was conducted in Mutasa District of Manicaland Province in Zimbabwe. Wards 15-Murindiko, 16-Mount Jenya, 19- Moyoweshumba and 20- Mapara were chosen as the study areas. The district is 30 km northeast of Mutare. Mutasa district in agro-ecological region I (one) characterized by high rainfall and low temperatures. The area is suitable for crop production.

3.3 Research Design

The study adopted an analytical cross sectional quantitative research design because of the nature of the research objectives. Creswell (1994) argues that quantitative research refers to a type of inquiry that explains phenomena through collecting and analysing numerical data using mathematical methods. Quantitative approach is one in which the researcher uses positivist claims for developing knowledge, employs strategies of inquiry such as surveys and collects data on predetermined instruments that yield statistical data (Gray, 2004). Such research is based on traditional scientific methods, which generate numerical data and usually seek to establish relationships between two or more variables, using statistical methods to test the strength and significance of the relationship (FHA, 2012).

3.4 Population and Sampling

3.4.1 Sampling Frame

The target population was smallholder sugar-bean farmers that were exposed (adopted) to the Agro-dealer input distribution system and those that were not be exposed (not adopted) to the Agro-dealer input distribution system between the 2020 to 2021 cropping season. The study used one agro-dealer's input distribution system. The agro-dealer has structured distribution points in Mutasa District, particularly around the Watsomba business centre catchment area that are ideal for the purposes of gathering information on the impact of their input distribution system. The agro-dealer was Major Family Savings Group (MFS Group).

There are over six thousand sugar bean farmers in the targeted Mutasa District, which makes the study population. A small sample of the sugar-bean smallholder farmers in Mutasa District was purposively selected from Wards 15-Murindiko, 16-Mount Jenya, 19-Moyoweshumba, and 20-Mapara to represent the study population. The wards were selected in order of production rank, highest producing, medium, and least producing wards.

3.4.2 Sample and sample size

The study used the Rao soft calculator to calculate the sample size. Using a Confidence level of 95%, a Margin of error of 5%, and a population size of 200 sugar-bean farmers, the sample size of 132 farmers was sufficient for the purpose of this study.

3.4.3 Sampling process and procedure

For the purposes of this research, the probability sampling method used was the simple random sampling method. Simple random sampling method chosen for its merits in giving every smallholder sugar-bean farmer an equal chance of selection to represent the study population. Local government extension officers (AGRITEX) of Mutasa District assisted by providing a list of sugar-bean smallholder farmers in the study area. The sampling procedure explained in steps 1 to 3 below,

Step 1- Pre-code sampling frame 1-200

Step 2- Generate random numbers using the random integer software

Step 3- Use the Random Integer output to assign the random integer value to the pre-coded population.

3.5 Data collection instruments

The researcher collected cross sectional primary data through personally administered interviews using structured questionnaires from the four wards of Mutasa District. Data collection adequately provided responses to the study research objectives. Therefore, the questionnaire was designed to gather information relevant in addressing the proposed objectives. The questionnaire was pre-tested and modified before the actual data collection process. Key information on production factors of sugar-bean farming for example, access to hybrid sugar-bean seed, access to fertilizers, pesticides, land size planted, as the push factors to measuring the impact of agro-input distribution system on productivity,

constituted the bulk of the questionnaire. Information on Institutional and socio-economic factors that contributed to productivity captured in the questionnaire.

Key informant guide for key informant questions. Focus group guide to gather in depth knowledge and understanding of the study objectives.

3.6 Data collection procedure

The study used a household survey to collect primary data. A survey was preferred as it is deductive logic and is a regular method of collecting data by employing a questionnaire that collects data from a sample then statistically analysing the data (Saunders *et al*., 2009). Furthermore, it has become accepted as a scientific and accurate way of collecting data to quantify gathered information (Zikmund *et al*., 2010).

The researcher collected cross sectional data assisted by two enumerators. Personally administered household interviews were carried in the randomly selected five villages on selected sugar-bean farmers to have a higher response rate. Agritex officers, Micro-finances, output-buyers, NGO staff interviewed as key informants using key informant guides to find their thoughts and involvement in the study. Focus Group Discussions (FGD) to gather in depth understanding of the study objectives. Farmers are hypothesized as household heads who are eligible and above 18 years of age.

3.7 Analysis and Organization of Data

For the purposes of this study, descriptive statistics and econometric analysis was used. A Multiple regression model was preferred in econometric analysis.

3.7.1 Identification of challenges and opportunities

Descriptive statistics was used to analyse challenges faced by smallholder sugar-bean farmers of Mutasa District. Specifically, descriptive statistics provided information on;

i. Institutional factors affecting productivity of sugar-bean farming in Mutasa District. These included, market access, credit access, access to extension and training education, and

Socio-economic factors affecting productivity of sugar-bean farming in Mutasa District. This included, age, gender, experience, distance to market, off-farm income etc.

3.7.2 Factors influencing sugar-bean productivity

The study employed a multiple regression model to examine production factors, institutional and socio-economic factors influencing sugar-bean productivity.

The research borrowed from a study by Bhasera (2016) who selected various production, institutional, socio-economic, cultural and environmental factors as covariates to explain variation in productivity and profitability of smallholder maize producers in Mazowe District, Zimbabwe. In this analysis, focus was on finding the impact of an agro-input distribution system on productivity of sugar-bean by smallholder farmers of Mutasa District, Zimbabwe. The multiple regression analysis model was applied to find factors influencing productivity of sugar-bean farmers. Productivity of sugar-bean farming (exposed to agro-input distribution system that is adoption; and not exposed to agro-input distribution system, non-adoption) is the dependant variable. Production factors, institutional factors, and socio-economic factors were the covariates explaining variation in production productivity of smallholder sugar-bean producers in Mutasa District.

The Multiple Regression Model adopted took the following form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots \beta_n X_n + \varepsilon$$

Where, $\boldsymbol{Y}$ is the Dependent variable

$\beta_{0-n}$are the coefficients to be estimated

X_{0-n} are the independent variables

ε is the error term.

Table 3.1 Description of Variables used in Multiple Regression Model

Variable	**Variable Description**	**Hypothesis**
	Dependant variable	
Productivity- **(Yield per area planted)**	Dummy variable for Productivity; 0= not productive; 1= productive Sugar-bean farmer was considered productive if s/he was exposed to agro-input distribution system and hence an increase in yield per area planted.	
	Independent variables	
Access to hybrid sugar-bean seed (Nua 45)	Cost of seed (Nua 45) in US$/kg	+

Access to Fertilizer	Cost of fertilizer pack in US$/kg pack sizes	+
Access to pesticides and fungicides	Cost of pesticides and fungicides in US$/pack size	+
Size of plot planted	Size of landholding the household has access to in hectares (ha).	+
Access to credit	Access to agricultural credit (1=yes, 0=no)	+
Distance to markets	Distance in Km	-
Extension and training education	Access to extension advise (1=yes, 0=no)	+
Age	Age of household head in years	
Household size	Household size	+
Off-farm income	Household other income in US$ per year	+
Farmer groups	Membership to farmer groups e.g. ZFU (1=yes, 0=no)	+

3.7.3 Impact of agro-input distribution system on sugar-bean productivity

In order to assess the impact of agro-dealer's input distribution system on sugar-bean productivity, the study adopted the theory of change framework following the work of Osei *et al*., (2018). According to this theory of change framework, impact can be defined as the outcome for exposure (adoption) minus outcome for non-exposure (non-adoption).

In this case, the difference in yields per area planted of sugar-bean farmers exposed to the agro-dealer's input distribution system (adoption) and those non-exposed to the distribution system (non-adoption) from the three most recent seasons were analysed using the Gross Margin Analysis.

3.8 Ethical considerations

Ethical issues were addressed before going to collect data in the field. Ethical issues key to the study were confidentiality, right to privacy, social responsibility, personal respect and dignity to all respondents. As such, the researcher initially sought for an approval document from the Africa University Research and Ethics Committee (AUREC). Approval was also sought from the Mutasa District Administration Offices, Agritex Offices, Village elders for ease of access into the District Wards, villages and in turn households in respect and dignity. The researcher strictly adhered to basic social science ethical considerations which include; integrity, professional competency and scientific responsibility among others.

In order to address the above, participants were briefed about the research and assurances was gathered for educational purposes only and that no names of respondents will be mentioned in the writing up of the research. The right to opt out of the study if the respondents feel issues being discussed are against their conscience were extended to participants. A consent form was read to farmers so that they sign voluntarily.

3.9 Management of Risk

COVID-19 continued posing life-threatening risks to everyone. The data collectors and the respondents were at high risk of contaminating and spreading the pandemic. To minimize this risk, the researcher ensured that;

- Data collectors and respondents were wearing masks and rubber gloves at all times during the collection of data.
- Data collectors maintained social distancing at all times.
- Data collectors and respondents were strictly adhering to the rules and instructions laid out by WHO to safeguard each other against the COVID- 19 pandemic.

3.10 Summary

This chapter described the research methodology used in this study. Research design, sampling frame, data collection instruments, procedure and ethical considerations. Chapter 4 presents the findings of the study.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter identifies, describes and analyses the results of the research to explain and conclude the impact of agro-dealer's input distribution system on sugar bean farmers productivity in Mutasa district. The chapter looks at the factors affecting the agro-dealer's input distribution system, effect of the agro-dealer's input distribution system on sugar-bean production productivity returns, opportunities offered to agro-dealers by the agro-dealer's input distribution system and challenges faced by smallholder sugar-bean farmers. These help to meet the study objectives and answer the purposed research question. The chapter is in two main sections. The first section presents the results of the survey whilst the second section is on discussion and interpretation of the findings.

4.2 Data Presentation and Analysis

The researcher collected cross sectional primary data through personally administered interviews using structured questionnaires from the four (4) wards in the study district. Data collected for key variables such as household demographics, information on production factors of sugar-bean farming, for example, access to hybrid sugar-bean seed (Nua 45), access to fertilizers, pesticides, land size planted, as the push factors to measuring the impact of agro-input distribution system on productivity, constituted the bulk of the questionnaire. Information on Institutional and socio-economic factors that contribute to productivity captured in the questionnaire.

4.2.1 Challenges Faced by Farmers in Accessing Farm Inputs

The study engaged the use of the participative technique to determine the intensity of each of the challenges faced by farmers in accessing farm inputs using Ranking and Scoring. In this technique, ranking and scoring used to identify farmers' assessment of challenge affecting them in acquiring inputs in Mutasa. Farmers were asked to show by raising their hands for each challenge to indicate their views on the challenge how it is affecting them. The overall vote value for each challenge calculated as:

$$V = x_1w_1 + x_2w_2 + x_3w_3 + \cdots + x_nw_n$$

Where:

V = Overall vote value

w = weight of answer choice

v = response count for answer choice

Table 4.1 Challenges faced by farmers in Mutasa district

Challenges	Scores by count				Overall Vote	% contribution
Scores	4	3	2	1		
1 Lack of improved seed varieties	17	19	8	25	166	18.5%
2 High cost of inputs	30	9	12	18	189	21.1%

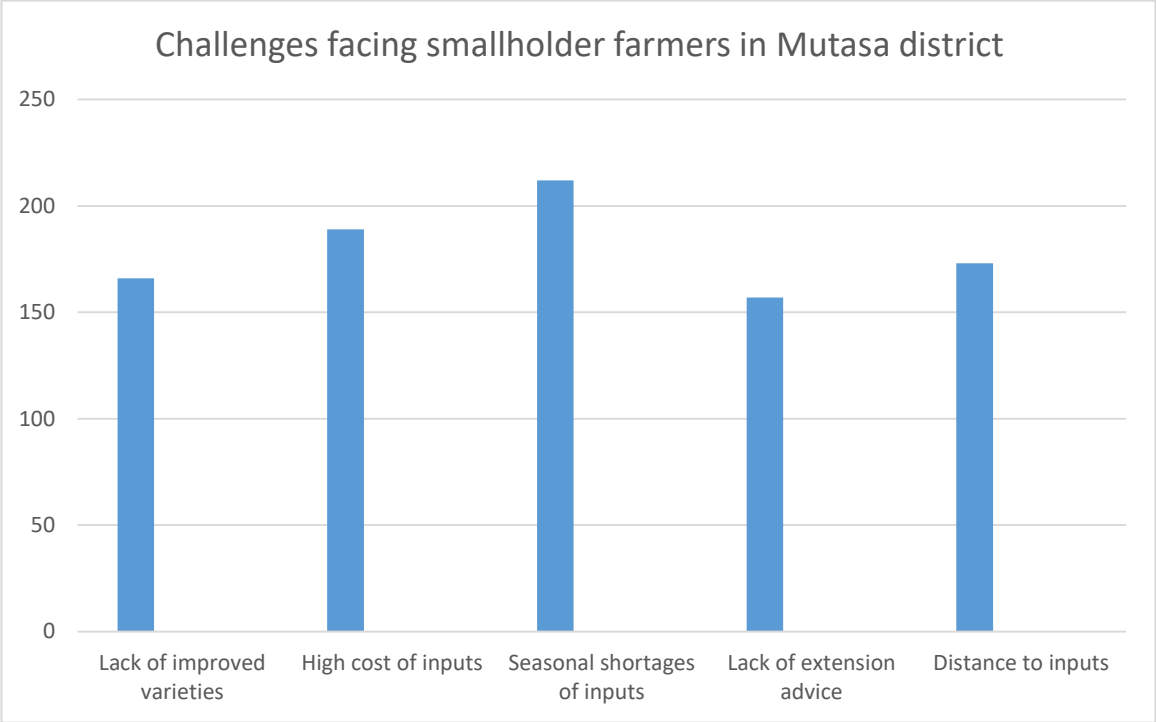
3 Seasonal shortages of inputs	35	15	9	9	212	23.6%
4 Lack of extension advice	16	13	15	24	157	17.5%
5 Distance to where inputs are found	19	17	13	20	173	19.3%
Totals					**897**	**100%**

The five challenges highlighted in table 4.1 above were assigned scores corresponding to farmers' perceptions. The responses were likert scale type where scores ranges from 1-4, 4 representing the most affecting challenge and score one the least affecting challenge.

4.2.2 Challenges facing smallholder farmers in Mutasa district by their rank

Seasonal shortages of inputs emerged as the major challenge affecting smallholder farmers in acquiring farm inputs in Mutasa district with a score of 212 and contributing 23.6%. High cost of inputs ranked second among the challenges affecting smallholder farmers' access to inputs in Mutasa district with a score of 189 and a 21.1% contribution. Lack of extension advices contributed 17.5% emerging as the least problem affecting smallholder farmers in input acquisition with the lowest score of 157. Furthermore, distance to where inputs are and lack of improved seed varieties are among the major challenges in Mutasa district, they scored 173 and 166, contributing 19.3% and 18.5% respectively. The scores are illustrated by Figure 4.1 bar chart below

Figure 4.1 Challenges facing smallholder farmers in Mutasa District



4.2.3 Factors influencing sugar-bean production productivity in Mutasa district

This section presents the results of the data collected on the factors affecting sugar-bean productivity in Mutasa district. As mentioned in chapter 2, the factors under consideration in the analysis are access to hybrid seed (Nua 45), access to fertilizer, access to pesticides and fungicides, size of plot planted, distance to market, household size, access to credit, extension and training education, off-farm income and farmer groups. All the independent variable has a pre-assumed effect that can be positive or negative, and this predict the significance of the affection. Positively predicted effects are expected to give a

significance effect, while negatively assumed effects are expected to give no significance effects, for example distance in this case. The results analysis from this chapter however weighs the predicted assumption against the calculated assumptions and justifies the hypothesis.

4.2.4 Econometric Modelling

SPSS V16 was used to analyse data. The model formulated by variables that were proposed to contribute in affecting the agro-input distribution system either positively or negatively, that is to say significantly or non-significantly as shown in table 4.2. For the determination of the model's significance; R-squared values were calculated and this is displayed on table 4.2.

Table 4.2 Model Summary

R-Square	
Cox and Snell	.560
Nagelkerke	.733
	.

Table 4.2, displays summary of the R-squared values of the model. The co-efficient of determination (R2) value is an indication of how much variation in Y is explained by the model in standard regression (Stevens et al., 2008). From the table results, we can conclude that between 56% and 73% factors of the agro-input distribution scheme

explained by the model. Such a percentage range is beyond the rejection criterion and therefore is significant and we can conclude that the study hypothesis model has to be accepted.

Table 4.3 Variables in the Equation:

	Variable		B	SE.	Wald	DF	Sig.	Exp(B)
Step (1a)	Access to hybrid sugar-bean seed (Nua 45)	AH	3.001	2.040	4.001	1	.039	21.425
	Access to fertilizer	AF	.503	.349	3.041.	1	.109	2.435
	Access to pesticides and fungicides	AP	.235	2.132	.002	1	1.032	1.244
	Size of plot planted	S	.236	2.431	.001	1	0.899	1.195
	Access to credit	AC	.001	.010	.000	1	.899	.999
	Distance to markets	D	-3.441	2.495	4.501	1	.025	28.434
	Extension and training education	E	1.104	1.104	1.000	1	.450	.456
	Age	A	-.051	.649	.047	1	.785	.941

	Household size	H	-.034	.005	6.463	1	.009	0.994
	Off-farm income	i	2.443	1.456	3.456	1	.025	28.115
	Farmer groups	G	.023	.010	4.433	1	.571	0.995
	Constant	**K**	-5.894	4.069	3.428	1	.143	.003

The table 4.2 shows the variables used in the model. In the table, B represents the co-efficient for the model and Exp (B) is the odds ratio. A negative value under column headed B means that the odds of productivity decrease for that particular variable.

The parametric model was given as follows:

$$Log\ (Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_n X_n + \mu$$

Where Y = Productivity (Yield per area planted); and μ = error term.

Therefore, in logistic regression equation, the logarithmic value (In) of productivity impact is:

$$Log(\Pr Y) = -5.894 + 3.001AF + 0.505AF + 0.236S + 0.001AC + 1.10E + 2.443i + 0.023G - 0.034H - 0.51A - 3.441D + \mu$$

From the model, all the variables have expected signs except for age and household size. Moreover, both these variables together with distance travelled, made up variables that did not significantly influence sugar-bean production productivity in Mutasa district. The variables that significantly significant are access to hybrid seed, access to fertilizer, access to pesticides and fungicides, size of plot planted, access to credit, extension and training education, off-farm income and farmer groups. These variables influenced productivity positively.

4.2.5. Discussion and interpretation

Access to hybrid seed (Nua 45)

Access to hybrid seed (Nua 45) is statistically significant at 5 % confidence level. Results gave evidence that access to hybrid seed has a positive influence on productivity of sugar bean farmers' produce. A percentage increase in access to hybrid seed increases productivity by 3%. The findings concur with other studies such as Macneil et al. (2010), who found that hybrid seed positively relate to crop productivity among smallholder farmers.

Distance to market

Distance to market is statistically significant at 5% confidence level. A kilometre increase in distance from the market will reduce productivity by 3.44 %. Thus, so because farmers who are far away from the market do not have access to agricultural inputs and they face high transport costs of transporting both inputs and outputs to the market. Like other studies in Zambia by Ngoma et al 2017, who finds that distance to market is an important factor affecting maize yield in the country.

Household Size

Household size is statistically significant at 5% confidence level. An increase in household size by one family member will decrease productivity by 0.03%. Other studies found a positive relationship between household size and productivity. In this study I expected a positive relationship but the results showed a negative relationship because most

households had school going children who were not actively involved in farming activities. Majority of households in the area used hired labour.

Off farm income

Off farm income is statistically significant at 5% level. A percentage increase in off farm income will increase sugar bean productivity by 2.44%. Farmers with off farm income can purchase hybrid seeds, fertilisers and herbicides way before sugar bean season starts (in time) which increased their productivity. Farmers with off farm income had capacity to prepare their land and irrigation facilities ahead of the season and thus prepare for adverse climatic changes that are a major contribution to risks posed by natural shocks. Crop production is affected by climatic shocks such as drought hence, if a farmer has off farm income, he/she can adapt in the event that these shocks occurs.

Access to fertiliser

Access to fertiliser is statistically significant at 10% level. Productivity of farmers with access to fertiliser will increase by 0.5% compared to those without access to fertilisers. Fertiliser improves soil fertility and ensures good quality sugar beans. Siziba et al., (2008), found that fertiliser affect productivity of cotton producers in Zimbabwe. Authors concur that, yield gaps are evident between farmers with/without access to fertilizer.

4.3 Determining the impact of agro-dealer input distribution system on returns to crop productivity of smallholder sugar bean farmers of Mutasa District

This section of the chapter involves the analysis on the impact of the agro-dealer input distribution system on returns to crop productivity of sugar bean farmers of Mutasa District as per the data collected. This impact of agro-dealer input distribution system on

returns to crop productivity of sugar bean farmers of Mutasa District was determined by the financial concept of gross margin analysis. The gross margin analysis is a financial instrument on the determination of production profitability and return (Randal 2005).

4.4 Gross Margin Analysis

Gross margin represents the difference between total revenue from total crop output and the total variable costs incurred. In this study, this measurement was between smallholder sugar bean farmers exposed (Beneficiaries) to the agro-input distribution system and non-exposed (non-Beneficiaries) of the agro-input distribution system. The gross margin calculated using the formula;

Total revenue – Total variable costs

Total revenue was calculated by multiplying the average yield of sugar beans and other crops with an average price for the farmers in Mutasa district in 2019 then adds the revenues sugar bean for each of the beneficiaries and non-beneficiaries of the agro-input distribution. The total variable costs were calculated by simply adding the average cost of producing the sugar beans and other crops by each farmer. The gross margin was calculated as a total for the three crops because farmers were not able to give variable costs for each individual crop but they could give the total costs incurred in crop production. The gross margins for the beneficiaries and non-beneficiaries of the agro-input distribution were then compared in Table 4.4 below;

Table 4.4 Gross Margins analysis results.

	Beneficiary	**Non-beneficiary**
Average farm size (ha)	5.3	5.4
Yield (kg)		
Sugar bean	450	243
Other Crops	793	643
Prices ($/kg)		
Sugar bean	0.35	0.35
Other crops	0.30	0.30
Revenue ($)		
Sugar bean	157.50	85.05
Other crops	237.90	192.90
Farm total revenue ($)	**395.40**	**277.95**
Total variable costs ($)	**281.7**	**287.45**
GROSS MARGIN ($)	**113.20**	**(9.50)**
GROSS MARGIN/HA($)	**20.96**	**(-1.76)**

The results of the gross margin analysis in Table 4.4 above shows that the beneficiaries of the agro-input distribution had a positive gross margin per hectare of $20.96 whilst the non-beneficiaries of the agro-dealer input had a negative gross margin per hectare of $1.76. Therefore, in general the beneficiaries of the agro-input distribution system obtained a higher gross margin as compared to the non-beneficiaries of the agro-input

distribution system. The gross margin per hectare for the whole sample was generally positive. From the gross margin analysis, agro input distribution system is important to productivity. Sanchez and Jama, (2002) noted that limited access to necessary agro-inputs has been the cause of low agricultural productivity and the overall poor economic growth and development in most parts of Sub-Saharan Africa. The results of the gross margin analysis clearly brought to light this argument.

The study revealed that the beneficiaries of agro-input distribution system attained a positive gross margin of about $20.96 per hectare. Chianu (2002) and Ayieko (2006) both concur that agro-input distribution systems play a vital role in guaranteeing that farmers have access to some of the essential agricultural inputs that contribute to boosting agricultural productivity.

4.5 Identified Opportunities for Agro-dealers through the input distribution system in Mutasa district

The information gathered from agro-input distributers and key informants through interviews in relation to the available opportunities for agro-input distributers in Mutasa district shows that every farm household in the community is a potential customer for agro-input distribution and supply. As a result, this implies that an increased consideration of such an opportunity by agro-dealers to supply diverse agricultural equipment and services is essentially a profitable case. Such an improvement would help overcome some problems faced by the farm households and the opportunity can be considered as a two-way channel, involving supply of agro-inputs and marketing of agricultural products produced through the aid of agro-input distribution system. The marketing of farm

produce helps farm households earn returns at a faster rate as well as engage into bulk supply of farm products.

This agrees with suggestions made by the Netherlands Development Organization (SNV) 2016. It stated that development investments and interventions of any kind can be successful in the long term if both the targeted group(s) for which the benefits are intended and the key actors/groups involved in providing related goods and services have the individual and collective capacity to sustain the gains on their own over time.

The results clearly show that existence of an agro-input distribution system at a proximity to smallholder farmers produces excess incomes for the farmer (shown by the $20.96/ha margin). This result is on sugar bean crop which is not even the main cash crop in most communal and districts of Zimbabwe. Thus if sugar beans can produce such a positive Income for smallholder farmer with availability of agro-input access, there is reason to suggest that there is great potential and opportunities for agro-input dealers who want to take up these opportunities of setting up in proximity areas to communal farmers. Mutasa District's key cash crops are sugar bean and bananas. Improved smallholder farmer's income can result in ability to purchase inputs for other rotational crops. Banana is a perennial crop in Mutasa District, thus improved incomes mean smallholders have capacity to purchase inputs targeted at improving the crop yields of this cash crop, thus further increasing their household incomes. Agro-input dealers stand to benefit from a growing community as they also grow in sales and revenue.

A growing communal area, with smallholder farmers with disposable income is an opportunity to introduce a wide range of productive farming ventures. Poultry production, Fish production, pig production are all very lucrative and quick returning ventures an agro-

input dealer can introduce to a growing smallholder farming community. Introducing these production circles assures the agro-input dealer sustainability of sales during off-seasons of the key cropping calendar. This also helps smallholders to earn income all year and hence increases their buying power come the peak of the main cropping calendar.

A positive income for each smallholder farmer means there is likely to be repeat sales from the farmer on the next cropping produce and because there is positive income, there is likely to be growth in their unit purchases and thus growth in sales for the agro-dealer.

There is great opportunity for the input-distributor or agro-dealer to be an agribusiness lead firm distributing inputs from the input manufacturers and a key player in the supply value-chain. Poulisse, (2007) agrees with this by noting that, “agro-input dealers can play a major role in ensuring that farmers access some of the important agric-inputs required to improve agricultural productivity in their respective farms”.

4.6 Challenges Faced by Smallholder Farmers in Acquiring Inputs

The participative technique was used to assess the severity of each of the challenges using Ranking and Scoring. Ranking and scoring used to identify farmers’ assessment of their most challenge affecting them in acquiring inputs in Mutasa. Farmers were asked to show by raising their hands per challenge to indicate their views on the challenge how it is affecting them.

Seasonal shortages of inputs: Seasonal shortages of inputs contributed 23.6% and emerged as the major challenge affecting smallholder farmers in acquiring farm inputs with a score of 212. Business community who are into the business of selling inputs to farmers do not have the capacity to serve all the farmers in the area or are non-existent in some cases thus contributing to this major challenge.

High costs of farm inputs:

High cost of inputs was the second ranked challenge faced by sugar bean farmers in the district with a 21.1% contribution. Olwande & Mathenge, (2010) had highlighted that most private traders and input suppliers are perceived to locate and confine their businesses close to towns and market hubs where infrastructure is relatively well developed. For this reason, the majority of farmers may not afford to travel long distances to these markets hubs to purchase the quality, affordable inputs. The few that sacrifice the travel cost, still find the unit costs of their inputs increasing, as there are logistics costs to move these bulky inputs (e.g. fertilizers, seeds, ploughs) from the agro-input distributor shop to where farmers access their communal area commuters. The commuters also charge such bulky inputs per unit to transport from the town or market hub centres back to the smallholders' community areas. There are charges at each of these logistics points. There is also high risks of thieves/conman who target these farmers especially when the key production seasons are at their peak. Farmers also face the risks of either having their hard-earned incomes stolen or being conned into purchasing sub-standard inputs in the name of hoping to save a dollar.

Lack of improved varieties: Lack of improved crop varieties is another challenge faced by smallholder farmers in the district. Kwasi, (2018) agrees with this by arguing that, farmers living in areas that are more rural, usually cut off from the input markets and extension services, which ultimately affect both technology adoption and productivity negatively.

Lack of extension advice: Lack of extension advices emerged as the least problem affecting smallholder farmers in input acquisition with the lowest score of 166. Though extension agents are readily available for smallholder farmers in Mutasa district, most of these agents are not mobile hence are not likely to attend to a growing number of smallholder's farmers concerns or problems in the fields. Most of the Agritex agents rely on outdated agricultural practices to solve the ever-evolving challenges posed to smallholders, which range from rapid climate changes, aggressive and more resistant pests and diseases. The agents are usually unaware of new and improved fertilizers, chemicals and technologies to curb these problems or challenges. SNV (2016) supports this by noting that, the extension service agents are incapacited with the extension officer to farmer ratios continuously growing at ward/community levels.

4.7 Summary

This chapter presented and emphatically analysed data and results as per the findings of the study. The findings presented descriptively with the aid and involvement of graphs and tables that were thoroughly explained. The next chapter, chapter five presents' conclusions and recommendations to this study and the chapter ends with suggestions for further research.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter marks the end of the research, and concludes on the research. Here the researcher discusses upon the research findings and discusses the implications of the findings thereof. In addition, recommendations and the chapter further suggest areas for further research.

5.2 Discussion

With relevant consideration of the study objectives and research questions, the study conducted has shown that the agro-dealer's input distribution system is of great impact towards the crop returns of sugar bean farmers in terms of profitability. This therefore denotes its relevance in production productivity. The study has identified keynote factors as challenges affecting smallholder farmers' access to farm input. These being seasonal shortages and high cost of inputs. Therefore, these are the major challenges that the government and development agencies need to concentrate on and improve them where possible in smallholder farming areas, to improve smallholder farmers' access to the farm inputs. The gross margin analysis confirmed that smallholder farmers who acquire inputs using the agro-dealer input channel achieve higher returns from crop production as compared to smallholder farmers who do not have access to the agro-input distribution system and its services. An econometric model formulated in mathematical terms the standard algorithm for the agro-input distribution system in terms of sugar bean productivity. This model made up of factors affecting productivity as equation variables.

5.3 Conclusions

From the finding of this study, the agro-dealer scheme has a positive impact in improving returns from crop production of smallholder farmers. Smallholder farmers who access inputs through the agro-dealer scheme were food self-sufficient and food secure than smallholder farmers who do not have access to the input program. Both the beneficiaries and non-beneficiaries does not retain enough grain for consumption to last until the next harvest season after deducting the quantities for sale, but the situation was worse for the non-beneficiaries. Therefore, the agro dealer input scheme system has a positive effect in improving smallholder farmers' total household food output. The agro-dealer farm input scheme through ensuring delivery of affordable and quality farm inputs, locally, at the right time for farmers to be able to grow their crops results in increased in returns to crop production of farmers and an improvement in household food output of smallholder farmers' households.

5.4 Implications

The study has shown relevance of the agro-dealer's input distribution system to smallholder sugar-bean farmers of Mutasa district. Upon the finding of this study, the data and recommendation can be directly applied to practical perspectives for such a scenario as of the study. The prospects of this study's objective are highly substantial and transparent to the practical adoption of the study for use by agro-dealers of different varieties and interests for the sake of profitability. Be it the study is engaged into industrial consideration, there is an expected advancement in profitability and productivity of crops

on smallholder farmers. For the sake of improved outcome, the government and development agencies should avail loans for agro-dealers so that their reach to smallholders is wide, preseason stocking is timely, inputs are availed at affordable prices as they enjoy economies of scale in stock purchasing. With affordable inputs, at wheelbarrow distances from their farms, smallholders are likely to purchase more seeds, fertilizers, pesticides and fungicides devoted for their cropping season and as a result increase area devoted for crop production. Adoption of new technologies is encouraged and the impact of the input distribution system on the smallholders of that particular area sustainably aids in productivity of the smallholder farmer. A policy is needed that supports and encourages agro-input distribution systems to relocate their business units in these remote farming hubs such as Mutasa District. This should be enhanced through infrastructure development of road networks, electricity facilities, clean-taped water facilities, public toilets among a few. These promote accessibility of the farming hubs and the habitability of the areas especially in the case of the social amenities as these will be of use to the agro-input dealers' skilled labour, travelling farmers and others. Infrastructure development encourages other key value chain players to relocate to these farming hubs for instance banks targeting these rural farmers for loans, loans to the agro-input distributors, loans to other service providers e.g. output markets who buy smallholders produce for their processing.

Policy is also needed to setup infrastructure development of markets for example, cold storage facilities, grain storage facilities for use to the market value chain partners and for the smallholders to preserve their produce as they bring to markets and also reduce post-harvest losses which contribute to major losses in most smallholders harvests.

Government and development partners need to build interventions that support adoption of new farming technologies around the agro-input distribution model as it has proven to be significant in improving the productivity of smallholders even on a small cropping window crop like sugar bean in Mutasa district. There is reason to trust that the model can produce better results on other field or garden crops, even on livestock production and be self-sustaining for the benefit of the smallholders, the agro-input dealer and other value chain players who stand to provide supporting solutions to the needs of the value chain.

Government and development players can achieve productivity in smallholders, encourage adoption of new technologies, attain food security and improve smallholder income through this model that does not promote a donor/reliance syndrome but production value chain synergies that are sustainable over time for the communal smallholder. Such target specific policies can even promote city to rural migration thus de-centralising the concentrations of youths in cities and towns, as they will be attracted to production value chains in their communal homes that are productive and sustainable.

5.5 Recommendations

5.5.1 Agro-input distributors (agro-dealers)

Agro-input distributors must be capacitated through trainings on how sustainable models can be run in community settings. Agro-input distributor should seek to stock key inputs before the major seasons. Stocking before seasons helps agro-dealer to purchase stocks cheaper while they are still available. Agro-input distributors should seek to be a one-stop shop for the smallholder farmers. They need to provide agronomy extension services to smallholders on basic production guides. They can widen their product-stocking list to

include not just crop production lines, but also small livestock lines e.g. poultry, rabbits, piggery and aquaculture to widen their safety net during key production off seasons. Agro-input distributors can also use their networks to promote market linkages between farmers, input financers, produce markets and processors. Agro-input distributor should seek to create synergies with other dealers within their communities, to share ideas, to purchase products in bulk thus reducing logistics costs.

5.5.2 Policy makers

Government should prioritize infrastructure development in these communal hubs (road networks, electricity/solar powered community centres, health facilities). Such developments encourage business value chain players to move to these hubs. Such investments by government can help attract more youth into these community hubs as young agro-input distributors and help correct the rural to urban migration. The model outlined the lack of input absorption because of poor input access. Policy makers need to scale up absorption of agro-inputs in community farms through strengthening private sector agro-dealer networks. Incentives should target agro-input dealers who are keen on stocking products in community centres. Government should aim to increase extension agents in the communities thus reducing extension agent to farmer ratios within the wards. This will result in improved aggregate crop production in the nation and contribute greatly to the nation's food security and sustainable productivity.

5.5.3 Development partners

Development partners should seek to capacitate agro-input distributors in community hubs through basic business trainings especially on keeping records, purchasing stocks control basics, gross margin calculations as well as basic agronomy extension trainings. Agro-input distributors also need to be taught the value of having licensed operations. Development partners can also be the key vehicle in market linkages between agro-input distributors, farmers, input financers, produce markets. Since the agro-input distribution system has evidenced a positive effect in improving the returns from crop production of smallholder sugar-bean farmers, the government and development agencies must therefore scale up the agro-input distribution system through promotion of supporting value chain players who have similar interests in the produce and productivity of a smallholder community.

5.5.4 Service providing institutions

Input–financers such as Agribank, Microplan (FBC bank), Steward bank, Old Mutual (CABS) have a key role to play to support smallholder farmers and agro-input distributors who are active in community areas. The model has to be self-sustaining, thus it requires financial support though low interest rates input loans targeted at smallholders who are productive. Agro-input distributors can also benefit from such input loans that can help increase stock levels and reduce costs of transports and logistics. Another key service provider are produce markets and processors. There is a great opportunity to invest in backward integration by building processing or storage houses in community hubs who produce targeted fruits or grains. For instance, Mutasa district is a potential community

for processors like Cairns or Associated Foods Zimbabwe to build storage houses for collection of grains (beans, fruits, etc.) produced in this community. Key input suppliers and manufacturers can scale up technical knowledge, absorption and accessibility of inputs in community hubs by incentivising rural agro-input distributors. This can be done through transport discounts for bulk input purchases for the agro-input distributors. Free extension trainings to agro-input distributor staff, farmers and local extension officers on new technologies and basic production guides. Such services help agro-input distributors, farmers, extension officers to increase knowledge of new input technologies, thus input absorption speeds up, benefiting all players. This study showed that distance and cost of inputs strongly hinder the access of inputs to farmers but there is need to consider other factors such as level of education and household disposable income of the farmer, which may have a bearing on accessing inputs.

5.6 Suggestions for Further Research

There is also need to consider this model for further studies for instance in other production value chains like livestock production. These production value chains can provide other income to smallholders during off peak crop production seasons and provides a safety net for the agro-input distributor during the off peak cropping seasons concerning sales turnover, costs and profitability. There is also room to test the model on more field or garden crops to see if the Gross margin value could increase and its effects on productivity of the smallholder. The agro-input distribution model has huge potential to be a self-sustaining agro-input absorption vehicle in rural communities. There is thus need to test the model in other production value chains for productivity and a positive

gross margin value. There is also need to test the model given supporting policies therefore policy recommendations are also key in promoting success of such a model.

REFERENCES

AGRA. (2009): The Agro-dealer Development Program, Alliance for a Green Revolution In Africa. Retrieved from http://www.auc.msu.edu/fs2/zambia/tour/AGRA_Agro_Dealer_Development_Program.pdf

Agricultural Sector Survey report 2018-2019: Retrieved from https://www.financialgazette.co.zw/wp-content/uploads/2019/05/Agric-Survey-2019-WEB.pdf

Aramyan, L.H., Ondersteijn, C., Van Kooten, O., & Oude Lansink, A. (2006): "Performance indicators in agri-foods production chains", in Ondersteijn, C.J., Wijnads, J.H., Huirne, R.B. and van Kooten, O. (Eds), *Quantifying the agri-foods supply chain*, Springer, Dordrecht.

Aramyan, L.H., Oude Lansink, A., van der Vorst, J.& van Kooten, O. (2007): Performance measurement in agri-foods supply chains: a case study. *Supply chain management: An international Journal*, 12(4), 304-315

Baker, T.L., Simpson, P.M. and Siguaw, J.A. (1999): 'The impact of suppliers' perceptions of reseller market orientation on key relationship constructs", Academy of Market Science Journal, Nos 27/1, pp. 50-7

Chianu, J.N., Mairura, F., & Ekise, I. (2008): Farm Input Marketing in West Kenya: Challenges and Opportunities, *A Journal of Agricultural Research*, 3(3), 167-173.

Claro, D.P., Hagelaar, G., & Omta, O. (2004): The determinants of relational

governance and performance: How to manage business relationships? *Industrial Marketing Management,* 32, 703-16.

COMESA. (2009): Getting Fertilizers to Farmers: How to do it? Who should do it? & Why it should be done? *COMESA Africa Agricultural Markets Program (AAMP).* Retrieved from http://programmes.comesa.int

Demsetz, H. (1988): "The theory of the firm revisited", Journal of Law, Economics, and Organization, Vol. 4 No. 1, pp. 141-61

Dyer, J.H., & Singh, H. (1998): The relational view: cooperative strategy and sources of inter-organizational competitive advantage. *The Academy of Management Review,* 4 (4) ,600-679.

Etyang, T.B. (2013): Assessment of the role of agro-inputs dealers in dissemination and communication of integrated soil fertility management: the case of Siaya and Trans Nzoia counties, Kenya. The Board of Postgraduate studies (BPS) University of Nairobi, Kenya.

FAO. (2008): The state of food insecurity in the world 2008. Food and Agricultural Organization of the United Nations. Retrieved from ftp//ftp.fao.org/docrep/fao/011/i291e/i0291eoo.pdf

Ferguson, R.J., Paulin, M., & Bergeron, J. (2005): Contractual governance, relational governance, and the performance of inter-firm service exchanges: the influence of boundary-spanner closeness. *Journal of the Academy of Marketing Science,* 33(2), 217-234.

Ganesan, S. (1994): Determinants of long-term orientation in buyer-seller relationships. *Journal of Marketing,* 58 (2), 1-19.

Gulati, R. (1995): Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *The Academy of Management Journal*, 38(1), 85-112.

Han, J., Trienekens, J.H., Tan, T., Omta, S.W.F., & Wang, K. (2006): "Vertical coordination, quality management and firm performance of the pork processing industry in China", in Bijman, J,, Omta, S.W.F., Trienekens, J.H., Wijnands, J.H.M. and Wubben, E.F.M. (Eds), *International Agri-food chains and Networks: Management and Organization*, Wageningen Academic Publishers, Wageningen.

Hu, D.H., Reardon, T., Rozelle, S., Timmer, P., & Wang, H.L. (2004): The emergence of supermarkets with Chinese characteristics: challenges and opportunities for China's agricultural development. *Development Policy Review*, 22(5), 557-86.

IFAD. (2006): *President*, International Fund for Agricultural Development, http://www.ifad.org/events/op/2006/fertilizer.htp .

IFDC. (2010): *Abuja Declaration on fertilizer for an African Green Revolution*,http://www.ifdc.org/Alliances/Abuja_Declaration

LaLonde, B.J., & Pohlen, T.L. (1996): Issues in supply chain costing. *International Journal of Logistics Management*, 7(1), 1-12.

Lu, H. (2007a): *The Role of Guanxi in Buyer-seller Relationships in China: A Survey of Vegetable Supply Chains in Jiangsu Province*, International Chains and Networks Series, Vol. 1, Wageningen Academic Publishers, Wageningen.

Lu, H. (2007b): The role of Guanxi in buyer-seller relationships in China. A survey of

vegetable supply chains in Jiangsu Province. PhD thesis, Wageningen University, Wageningen.

Macneil, I.R. (1981): Economic analysis of contractual relations: its shortfalls and need for rich classificatory apparatus. *Northwestern University Law Review*, 75(1), 1018-1063.

Macneil, I.R. (2000): Relational contract theory: challenges and queries. *Northwestern Management Journal*, 94(3), 877-907.

Maunze, S. (2012): Agro dealers in Zimbabwe: Scaling Input Provision as key for successful small farmer engagement. SNV. Zimbabwe. Paper Presented at the SEAS of change Event in the Hague: 11-13 April 2012. SNV. Retrieved from www.snvworld.org/en/sectors/agriculture

Morgan, R.M., & Hunt, S.D. (1994): The commitment-trust theory of relationship marketing. *Journal of Marketing,* 58, 20-38.

Netherlands Development Organization (SNV) report (2016): Rural agriculture Revitalization program (RARP): Commercializing smallholder farming.

Netherlands Development Organization (SNV), (2016): *Rural Agro- dealer Restocking Program (RARP)* - Commercializing Smallholder Farming..

O'Donnell, E. (2009): Where are we now and where do we go from here? A review of the transaction cost-based Operations & Production Management. *Marketing Management Journal*, 19(3), 275-92.

Olomola, A. S. (2014): Determinants of Agro-Dealers' Participation in the Loan Market

in Nigeria. International Food and Agribusiness Management Review. 17(3), 65-84

Poppo, L., & Zenger, T. (2002): Do formal contracts and relational governance function as substitutes or compliments? *Strategic Management Journal*, 23, 707-25.

Poulisse, J. (2007): Increased fertilizer use opportunities and challenges for food security in Sub-Saharan Africa. *Paper presented at the 13th International Annual conference and Exhibition.* Arab Fertilizer Association, Sharm El-Sheikh, 6-8 Feb 2007.

Osei, R.D., Osei-Akoto, Ama P. Fenny, P, Adu., & Hodey, L. (2018): The Impact of Agro-dealer Training on Input Adoption and Farmers' Productivity in Niger: Has the Investment in Agro-dealer Networks Worked? *Institute of Statistical, Social and Economic Research,* University of Ghana

Sako, M. (1991): The role of trust in Japanese buyer-supplier relationships. *Ricerche Economiche,* XLV, 449-74.

Sako, M. (1992): *Prices, Quality, and Trust: Inter-firm Relations in Britain and Japan*, Cambridge University Press, Cambridge.

Sanchez, P.A., & Jama, B.A. (2002): Soil Fertility Replenishment Takes Off in East & Southern Africa.In: Vanlauwe, B., Diels, J., Sanginga, N., & Merckx, R. (Eds), *Integrated Plant Nutrient Management in Sub-Saharan Africa:* From Concept to Africa. CABI Publishing, New York.

Van der Vorst, J.G.A.J. (2000): Effective food supply chains. Generating, modelling

and evaluating supply chain scenarios. PhD thesis, Wageningen University, Wageningen.

Williamson, O.E. (1991): Comparative economic organization: the analysis of discrete structural alternatives. *Administrative Science Quarterly*, 36(2), 269-96.

Williamson, O.E. (1996): Transaction-cost economics: the governance of contractual relations.*The Journal of Law & Economics*, 22 (2), 233-261.

Yu, C.M.J., Liao, T.J., & Lin, Z.D. (2006): Formal governance mechanisms, relational governance mechanism and transactional-specific investments in supplier-manufacturer relationships. *Industrial Marketing Management*, 35, 128-39.

Zaheer, A., & Venkatraman, N. (1995): Relational governance as an inter-organizational strategy: an empirical test of the role of trust in economic exchange. *Strategic Management Journal*, 16(5), 373-92.

Zhang, X., & Aramyan L.H (2009): A conceptual framework for supply chain governance: An application to agri-food chains in China. LEI, Wageningen University and Research Centre, The Hague, the Netherlands.

Zimbabwe Smallholder Agricultural Productivity Survey 2017 report (Zim Stat 2018): http://www.zimstat.co.zw/wp-content/uploads/publications/miscellenious/Digest/2018/Digest_Q4_2018.pdf

APPENDICES

Appendix 1: Sugar-bean smallholder farmer Questionnaire

Interview questionnaire for the research titled*: Impact of agro-input distribution system on productivity of sugar-bean farmers in Mutasa District, Zimbabwe.*

QUESTIONNAIRE: **Sugar-bean smallholder farmer**

Data Collector No._____

Date of Data Collection: _____

Basic Information

Village _____ Ward_____

District _____ Province _____

	Variable		**Codes**
1.1	Interview date		
1.2	Questionnaire no.		
1.3	Enumerator no.		
1.4	Village name		
1.5	Ward number		
1.6	District		Mutasa
1.7	Country		Zimbabwe

B. HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

	Household characteristics	**Response**	**Codes**
2.1	Respondent No.		
2.2	Is the respondent the household head?		1= yes 0= no
2.3	If not, what is the relationship of respondent to household head?		1= spouse 2= child 3= other, specify
2.5	Sex of household head		1= Male 0= female
2.6	Age of household head in years		
2.7	Number of years in formal education for the household		1= primary 2=secondary 3= tertiary
2.8	Marital status of household head		1= single 2= married 3= divorced 4= widowed
2.9	Occupation of household		1= farming 0= otherwise
2.10	Size of Household		
2.11	Number of household members aged below 16		
2.12	Number of household members aged between 16-65		
2.13	Number of household members aged 65+		
2.14	Number of household members who provide labor in the fields		
2.15	Number of household members with off-farm employment		
2.16	Number of Years household has been farming		

Landholding capacity and allocation

3.0 What is the total size of land you cultivate in ha?

…….

3.1 What proportion of that land did you allocate to sugar bean farming this season?

…….

Sugar-bean crop management in the previous and current season.

4.0 Do you grow sugar-bean crop? 1= yes; 0= no

…….

4.1 What cropping system do you most prefer?

1= mono-cropping; 2= inter-cropping;

……..

4.2 Do you know of any hybrid sugar-bean seeds varieties? 1=yes, 0= no

…….

4.3 Which of the hybrid seeds do you use in your field?

…….

4.4 Do you apply any fertilizer at sugar-bean planting? 1=yes, 0=no

...……

4.5 Do you use any top-dressing application to your sugar-bean crop? 1= yes, 0= no

…….

4.6 Do you use any organic manure on your sugar-bean crop? 1= yes, 0= no

…….

4.7 Did you face any disease challenges on your sugar bean crop? 1= yes, 0= no

……..

4.8 What mechanisms did you use to control the diseases?

1= none; 2= pesticides/fungicides control; 3= removed affected plants; 4= other (specify)

…….

Sugar-bean productivity in the last cropping season

5.0 Which bean variety did you plant?

…….

5.1 What size plot did you plant in ha?

…..……..

5.2 Seed rate in kg planted?

…..…….

5.3 Where did you source these seeds?

…..……..

5.4 How many kg of fertilizer did you apply at planting?

…..…….

5.5 How many kg of top dressing fertilizer did you apply?

…..……

5.6 What was your production yield in kg?

…..…….

5.7 What was the average selling price per kg?

…..……..

Access to Inputs

6.0 How did you access the following inputs?

Input	Unit of measure	Preferred Source 1	Distance to preferred source	Average cost per unit	Quantity applied to crop	Any constraints to applying input? 2	Has input quantity applied improved from past seasons?
Hybrid sugar-bean seed							
Seed dressing							
Basal Fertilizer							
Top dressing fertilizer							
Folia fertilizer							
Insecticides/ pesticides							
Fungicides							
Herbicides							
Animal manure							

1 **Preferred Source:** ***1= MFS shop; 2= purchased from other farmers; 3= subsidy from government; 4= other (specify)***

2 Constraints to applying input: ***1= insufficient knowledge of input use; 2= far from household; 3= unsuitable pack sizes (too big); 4= lack of transportation; 5= other (specify)***

6.1 Did you experience any sugar-bean yield reduction in the past 4 seasons? 1= yes; 0= no

6.2 Is distance from market a major reason associated with costs of inputs?

6.3 Can you rank the factors that affect your sugar-bean yield in order of significance?

A. _____
B. _____

Sources of Income for the Household

Source of income	**Amount received past 12 months**	**Decrease**	**Increase**
7.1 Sales from sugar-bean crop			
7.2 Income from other farm activities			
7.3 Income from employment			
7.4 Income from Business proceeds			
7.5 Earnings from family remittances			
7.6 Agricultural loans from banks or micro-finance institutions			
7.7 Earnings from off-farm activities (e.g. sale of firewood, charcoal, casual labor			
7.8 Other Income earnings (specify)			

8.0 What are your sources of Information on sugar-bean farming?

Information source	Frequency of access	How useful is this information: rank 1 (least)-10 (most useful).	Has information access improved from previous seasons?
MFS agronomy advisory teams			
Extension officers			
radio			
Group members e.g ZFU			
local farmers			
Other (specify)			

9 Have you organized yourself and fellow farmers to buy inputs in bulk before? 1= yes, 0= no

…..……..

10 If yes, how many members in a group, what benefits did you enjoy in buying as a group?

…..……..

11 Are there any other challenges that you face as a farmer in your production of sugar-beans in Mutasa District

…..……..

12 What could agro-input distribution companies do to promote smallholder sugar-bean farmers' production productivity?…..……

13 Are there opportunities for other agro-input distribution firms in Mutasa District?

…..…….

Appendix 2: Focus Group Discussion questionnaire.

Interview questionnaire for the research titled*: Impact of agro-input distribution system on productivity of sugar-bean farmers in Mutasa District, Zimbabwe.*

Questionnaire: Focus Group Discussion (Government Extension Agents/NGO Agent/Micro-Finance)

Data Collector No._____

Date of Data Collection: _____

Basic Information:

Number of Respondents: Male_____Females_____Total No._____

Average age of Group :_____(years)

Departments represented: Government (Extension_____, NGO_____, and Other_____

Number of years operating in Mutasa District_____

Number of sugar beans Households served_____

INSTRUCTIONS TO RESPONDENTS:

-Your answers will be treated with confidentiality.

-The questionnaire will take about 30-45 minutes of your time.

1. **How do farmers in your area of operation access the following inputs?**

Input	**Unit of measure**	**Preferred Source 1**	**Distance to preferred source**	**Average cost per unit**	**Quantity applied to crop**	**Any constraints to applying input? 2**	**Has input quantity applied improved from past seasons?**
Hybrid sugar-bean seed							
Basal Fertilizer							

Top dressing fertilizer							
Insecticides/ pesticides							
Fungicides							
Herbicides							
Post-harvest Chemicals							

1 **Preferred Source:** ***1= MFS shop; 2= purchased from other farmers; 3= subsidy from government; 4= other (specify)***

2. **What are the roles played by the farmers preferred agro-dealer in your area of operation?**

_____
_____
_____

3. **In your opinion, has agro-dealer distribution system improved/not improved productivity of sugar bean farmers in your area of operation?**

_____
_____
_____

4. **What other services could agro-dealers in your area of operation provide to farmers that they currently are not providing?**

   _____
   _____
   _____

5. **In your opinion, are there any opportunities for agro-dealers to exploit that are currently not being exploited in your area of operation?**

   _____
   _____
   _____

6. **Is there anything that can be done to promote agro-input distribution systems in rural areas so as to make them sustainable?**

   _____
   _____
   _____

THE END
MANY THANKS FOR YOUR TIME

Appendix 3: AUREC Approval letter.

AFRICA UNIVERSITY
(A United Methodist-Related Institution)
INVESTING IN AFRICA'S FUTURE

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 website: www.africau.edu

Ref: AU1918/21

23 February, 2021

Lazarus Masunungure
C/O CHANS
Africa University
Box 1320
Mutare

RE: IMPACT OF AGRO-INPUT DISTRIBUTION SYSTEM ON PRODUCTIVITY OF SUGAR-BEAN FARMERS IN MUTASA DISTRICT, 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) Data collection instruments
c) Informed consent guide

- **APPROVAL NUMBER** AU1918/21
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** February 23, 2021
- **EXPIRATION DATE** February 23, 2022
- **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.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

Yours Faithfully

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

Appendix 4 Urkund Report

Analyzed document	LAZARUS MASUNUNGURE DISSERTATION 2022 Final.docx (D134409404)
Submitted	2022-04-23T14:12:00.0000000
Submitted by	
Submitter email	lazziemas82@gmail.com
Similarity	2%
Analysis address	mukumbik.africa@analysis.urkund.com

Sources included in the report

SA	Contribution592.pdf Document Contribution592.pdf (D20123482)	5
SA	Africa University / research study by kelvin (1).pdf Document research study by kelvin (1).pdf (D51692360) Submitted by: ihirwek@africau.edu Receiver: mukumbik.africa@analysis.urkund.com	3
W	URLhttps://snv.org/assets/explore/download/3._soc_zimbabwe_agro-inputs.pd Fetched: 2022-04-23T14:11:53.3930000	1
W	URLhttps://ageconsearch.umn.edu/record/134500/files/Waluse%20thesis.pd Fetched: 2020-07-25T15:26:18.2500000	6

Entire Document