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FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE DEPARTMENT OF AGRICULTURAL ECONOMICS AND MANAGEMENT

SOCIOECONOMIC AND INSTITUTIONAL FACTORS AFFECTING SOYABEAN PRODUCTION IN GURUVE DISTRICT, ZIMBABWE: STRATEGIES AND POLICY IMPLICATIONS

A Dissertation Submitted in Partial Fulfilment of the Requirements for the Award of the Bachelor of Commerce Honours Degree in Agribusiness Management

By

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Socio-Economic and Institutional Factors Affecting Soyabean Production in Guruve District, Zimbabwe: Strategies and Policy Implications.

Submitted in partial fulfilment of the Bachelor of Agricultural Science Honours Degree in Agricultural Economics and Management.

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DECLARATION

I, TINOTENDA N MARAMBIRE (B224292B), hereby declare that this dissertation is my own original work and has not been submitted for a degree or any other qualification at this or any other University or institution. All sources used have been duly acknowledged and referenced.

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DEDICATION

To my family, for their unwavering love, encouragement and sacrifice throughout this academic journey.

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ABSTRACT

Soyabeans are important for household food security, industrial processing and soil fertility improvement for Zimbabwe. However, current production levels of soyabeans are far below the annual demand which has been estimated to be approximately 220 000 metric tones. Production figures for 2024/25 showed that only 41,919 metric tones were produced and this deficit contributes negatively to food security and agricultural economic growth as it leads to high dependence on soyabean imports. This research examined some of the socio-economic and institutional factors which impact on smallholder farmers' soyabean production and recommended policy and strategies to increase production levels in Guruve District of Mashonaland Central Province, Zimbabwe. A cross sectional survey research design utilizing qualitative and quantitative methods was employed. One hundred and two smallholder farmers were selected using a purposive and simple random sampling technique and were administered structured questionnaires, interviews and focus groups discussions. The data were analyzed using descriptive statistics and multiple linear regression model. The analysis results revealed that level of education, farm size, access to credit, access to improved seed, extension services and farming experience had a statistically significant and positive impact on soyabean yield, farm size having the strongest impact on soyabean yield (=0.376, p<0.001), followed by access to improved seed (=0.318, p=0.001) and access to credit (=0.287, p=0.003). The overall model had an adjusted R 2 of 0.71, suggesting that these factors can explain up to 71% of the variability in soyabean yield. In relation to institutional factors and challenges, limited access to extension services, remoteness and unstable prices seemed to affect the productivity of smallholders negatively. Main production problems identified included input costs (40.2%), weather variability (21.6%) and poor quality of seed (18.6%). Access to extension services, improved seed and agricultural credit stood at 56.9, 59.8 and 36.3% respectively. In conclusion it can be said that both socioeconomic and institutional factors had an impact on soyabean production in Guruve. Expanding access to cheaper agricultural credit, improvement of improved seed accessibility, expansion of extension service coverage, development of irrigation infrastructure and establishment of consistent prices policies should be the way forward in order to address the gaps in yield levels of 1.2-1.6 tones/ha against 3 tones/ha and the dependence of Zimbabwe on imported soyabeans.

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LIST OF ABBREVIATIONS AND ACRONYMS

Agritex	Agricultural Technical and Extension Services
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Statistics Database
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GoZ	Government of Zimbabwe
ha	Hectare
IoT	Internet of Things
BUSE	Bindura University of Science Education
mt	Metric Tonnes
OLS	Ordinary Least Squares
SPSS	Statistical Package for the Social Sciences
VIF	Variance Inflation Factor
ZEPARU	Zimbabwe Economic Policy Analysis and Research Unit
ZIMSTAT	Zimbabwe National Statistics Agency

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CHAPTER 1

1.1 Background

Soyabeans (Glycine max) are globally one of the most economically important legumes grown and are steadily gaining prominence in Zimbabwe as a source of food and income as a cash crop Gatsby Africa, 2024 FAO, 2024. Apart from income generation for farming households, other benefits to the crop include enrichment of soil fertility through biological N-fixation, provision of feedstock for cooking oil production and animal feed supply to the dairy and poultry industries Gatsby Africa, 2024.

Although tobacco and maize have traditionally been dominant crops in Zimbabwe, the prominence of the soyabean crop has increased over time leading to it being accorded a more central position by development agencies and the state Gatsby Africa, 2024 FAO, 2024. The focus has since been on reinforcing the entire soyabean value chain from the field to industry, aiming to enhance agro-processing potential of the country and improve income of the smallholder farmers Gatsby Africa, 2024 FAO, 2024.

Guruve District, a smallholder mixed farming area in Mashonaland Central province serves as a reference point where soyabeans are also cultivated as a source of income and as a green fertilizer FAO, 2024. The farmers however continue to grapple with pervasive challenges including lack of access to productive resources, price variability, and lack of technical expertise and the impacts of a changing climate Mashonaland Central Zimvac, 2020.

Soyabeans contribute about 2-3% and 0.2-0.5% to the country's agricultural GDP and national GDP respectively NewsDay, 2025. However, although demand for soyabeans is at 220,000mt annually, it has recently decreased from 43,907 mt in 2023/24 to 41,919 mt in 2024/25 ZIMSTAT, 2025. Due to the continuing supply-demand imbalance, Zimbabwe has imported significant quantities of soyabeans and their products to feed its domestic market AllAfrica, 2024.

1.2 Statement of the Research Problem

For most smallholder farming households in Zimbabwe, the sale of Soyabeans has been a very important source of income for buying necessities such as food, fees for schooling and basic services (NewsDay, 2024). Despite this, there is a vast gap between what farmers expect to achieve

and what they can realistically produce in consistent, lucrative yields (Government of Zimbabwe, 2023). Farmers are hampered by a host of inter-related challenges in Guruve District. These challenges include lack of adequate quality seed, insufficient extension support, access to credit and unstable prices, which hinder their production choices (Zepari, 2018).

However, these implications go beyond the mere feelings of dissatisfaction on individual farms. Failure to obtain good yields, leads to reduced incomes for rural people, insufficient raw materials to supply local industries and continued inadequate supply for the whole agricultural industry. The national production of Soyabeans has dwindled from a high of 140, 763mt in 2001 to between 42,000-50,000 mt per year currently, way below what is required to satisfy industrial and food demand (ZEPARU, 2017; Allafrica, 2025).

The reduction is worsened by the fact that actual farmer yield is nowhere close to potential yields for small holder farmers. For majority of the small holder farmers in Guruve and other parts of Zimbabwe, their yields are currently less than 1.5 ton/hectare while the crop has potential to produce over 2.5-3 ton/ha with proper agronomic practices. Contributing factors include low support structures from institutions and poor adoption of technology and input use (HERALD, 2025). This results in a deficit in Soyabean production thus ensuring constant dependence on importation and a competitive agricultural economy is seriously threatened (ZEPARU, 2025).

1.3 Research Questions

The study was guided by the following queries:

1. How has Zimbabwe's production of soyabeans changed over time?

2. What economic and social factors affect Guruve District's production of soyabeans?

3. What institutional limitations affect Guruve District's soyabean productivity?

4. What workable plans and legislative initiatives may be created to raise farmer incomes and soyabean productivity in Guruve District?

1.4 Research Goals

The primary objective of this study was to investigate the institutional and socioeconomic determinants affecting smallholder soyabean production in Guruve District. It also aimed to

formulate actionable strategies and policy recommendations to increase productivity and enhance market performance.

The specific goal was to:

(1) analyse historical trends in Zimbabwe's soyabean production;

(2) Identify and profile the social and economic factors affecting soyabean output

(3) Assess the institutional constraints limiting yields

(4) Evaluate the effectiveness of existing strategies and policies while proposing improvements.

1.5 Research Hypotheses

Three hypotheses were formulated to guide the study. H1 proposed that smallholder access to higher-quality seed and chemical inputs is positively associated with soyabean production levels. H2 posited that restrictive grain marketing regulations and limited buyer competition do not materially influence farmers' willingness to expand cultivated soyabean area. H3 proposed that participation in extension training programmes does not significantly affect the adoption of improved agronomic practices for soyabean.

1.6 Justification of the Study

The study is significant to a number of stakeholder groups. It provides smallholder farmers with evidence-based assessments of the main production barriers and workable solutions to raise incomes and yields. Due in major part to limited access to inputs, inadequate credit and inadequate extension coverage, current average yields of about 1.6 tonnes per hectare continue to fall well short of both the crop's productive potential and national demand (Tumbure and Kanonge, 2025).

This study contributes to the academic literature by providing localized empirical evidence that integrates socioeconomic, economic and institutional dimensions at the district level. Although earlier studies have acknowledged the importance of market access, extension contact and input availability, district-level integrated analysis in Zimbabwe remains limited (Setoboli and Tshuma, 2024; Mudimu, 2021).

Findings provide government policymakers with a strong body of information for developing focused agricultural policies that boost food security, increase productivity and lessen reliance on imports. Policy change in this area is especially important because the country's yearly need for

soyabeans exceeds 200,000 tonnes and present production falls well short of that amount (Tumbure and Kanonge, 2025).

This study provides information that helps private sector actors such as financial institutions, agro-processors and input suppliers make informed investment choices and strengthen value chain coordination. Limited local soyabean production restricts these businesses and heightens their dependence on imports, even though soyabeans are a key raw material for cooking oil and stockfeed (Sedibe and Masvodza, 2023).

CHAPTER 2 Literature review

2.1 Introduction

This chapter reviews the body of research on the institutional, economic and socioeconomic factors influencing soy production at the global, African, Southern African and Zimbabwean levels. The evaluation is organized to gradually reduce the analytical focus from global manufacturing trends to factors at the national and, eventually, local levels. The chapter examines methods used in various settings to boost soyabean output in addition to recording production limitations. This synopsis highlights information gaps and offers the conceptual foundation for the study's methodological decisions.

2.2 Social and Economic Factors Affecting Soyabean Production

2.2.1 Global Perspective

A growing number of empirical studies indicate that household-level factors-such as education, labor supply, farm size and land tenure arrangements-are determinants of soyabean production at the global level (Sedibe and Mulaudzi, 2023). Education is always a robust determinant of technology adoption, where farmers with secondary or post-secondary schooling were more likely to understand agronomic advice, make better decisions on inputs, and adjust effectively to market fluctuations (Kassie et al., 2021). In Brazil, farmers with at least secondary education, by adoption of advanced modern technologies, achieve higher soyabean yield (25-30%) than those with only primary education (Mabhaudhi et al., 2023).

Another equally important variable of production outcomes is labor supply. Farmers in India found that having sufficient household or hired labor was essential to timely perform sensitive operations such as sowing, weeding and harvesting in optimum time (Chikowo et al., 2022). Data from China showed that smallholder farmers' yields dropped by 20-30% due to small farmers moving from rural to urban areas, and resulting in labor shortage on farms and hence delaying of operations (World Bank, 2022).

Variables like farm size and land tenure security are also important production determinants. Farmers who possess secure tenure with formal land ownership right in larger area in Argentina invested more on soil fertility management and resulted in approximately 15% higher yield than those tenants under tenure insecure system (FAO, 2022).

2.2.2 African Perspective

The socio-economic impediments remain the major bottleneck in increasing productivity in all over the Africa. For the case of smallholders where, majority of the soyabean producers fall, they face constraint of low household incomes, low level of formal education and very small plot of land holdings that restricts them from using improved soyabean technologies and keeping the production only at subsistence level far below the crop's agronomic yield potentials (Arajo and Chibwana, 2025; Sedibe and Mulaudzi, 2023).

The educational gaps can be visualized through the data on Tanzania where, farmers having no formal education yields an average of 0.6 tones per ha while those who are completed secondary school yields nearly 1.3 tones per ha of soyabeans (Kassie et al., 2021). For the case of Nigeria that has Africa's largestsoyabean production, average yield still remain at 1.1 tones per ha due to constraint in the budget constraints of the households and access of quality seeds. The yields obtained is very little as compared to achievable yields 2.5 tones per ha with the improved agronomic practices (Omondi and Bahta, 2024). Davis et al., (2022) data for Ghana on a case study also showed that the risk of not using certified seeds and relying on self-saved seeds from past harvest are 40 percent higher for farmers living more than 10 km from the seeds supply vendors.

Further, the problem is compounded with the gender disparities; the women contribute half to three fifths of total work force in the agriculture in Sub-Sahara Africa, but have restricted access to land, credit, and extension services (FAO, 2022). Malawi's female-headed households' yield for soyabeans was 30 percent lower compared to male-headed households (Mutenje et al., 2023). In Uganda women make up more than 60 percent of the labor force for crop cultivation but only owns less than 20 percent of the agricultural land and obtains only 10 percent of all agricultural loans (World Bank, 2022).

2.2.3 Southern Africa Perspective

Smallholder farming systems in Southern Africa are largely dominated by extremely small farm size, seasonal labor constraints, and extremely low level of mechanization, all of which lead to yield levels which are much below potential (Omondi & Bahta, 2024). The average Soyabean yield in the sub-region ranges between 0.9 to 1.4 tonnes/ha, compared to the world average of ~ 2.4 tonnes/ha (Mabhaudhi et al., 2023).

While Soyabean has been encouraged as a cash crop for smallholders, available evidence from Malawi showed that farmers cultivating less than one ha of Soyabean received yield of ~ 0.8 tonnes/ha, while farmers with > 2 ha obtained ~ 1.6 tonnes/ha (Chikowo et al., 2022). Similarly, seasonal labor constraint has been shown to reduce yield by 25-40% in the country. The introduction of tenure security was shown to lead to ~ 35% higher yield for Soyabean production compared to insecure arrangements in Zambia as farmers respond positively by improving the soil and increasing use of inputs (World Bank, 2022).

The most striking constraint in Mozambique has been lack of mechanization where 85% of the smallholder Soyabean farmers only use hoes which has been identified as a major cause limiting both the size of land available and timing of operations (Mutenje et al., 2024). In South Africa, smallholder farmers in former homelands are only yielding an average of 0.9 tones/ha mainly as a result of small and fragmented landholding, limited capital and lack of access to extension services compared to > 2.5 tones/ha that commercial farmers obtain (Omondi & Bahta, 2024).

2.2.4 Zimbabwean Context

The intensity of and quality of smallholder participation in soyabean production are determined by socio-economic factors in Zimbabwe (ZIMSTAT, 2025). Increases in input prices and lack of adequate access to certified seed and persistently low household income have kept the incentives for productive cultivation in check. Consequently, the use of farm saved seed and suboptimal fertilizer application has become a way of life for many smallholders leading to persistently low yields (Mutenje and Mlambo, 2023). Data from the Mashonaland Central Province survey indicates that only 35% of smallholder farmers are planting certified soyabean seed each season (ZEPARU, 2018).

There is a clear educational gradient in production for the district: farmers with secondary education average yields of 1.5 tonnes per hectare and those with primary education average yields of 0.9 tonnes per hectare (Field Survey Data, 2026). The size of the household is also important. With five to seven household members, it is possible for farmers to have adequate family labor to perform the necessary operations, weeding and harvesting among them. Smaller households often lack this family labor and yields decline by up to 30% (Mutenje et al., 2023). The reliance on manual labor also presents an additional bottleneck: only 12% of smallholder soyabean farmers in

Mashonaland Central Province had access to tractors or animal draft power, limiting both the area that can be put under cultivation and the efficiency of operations (Tumbure and Mutenje, 2025).

2.3 Economic Drivers Affecting Soyabean Production

2.3.1 Global Perspective

Economics have always played a critical role at each stage of the production of soyabeans. Economic sustainability of investment is a function of production inputs costs (fertilizer, certified seed, agrochemicals), whereas whether output prices will be profitable is function of input prices and access to market (FAO, 2022). Both lending facilities and output subsidies from the government contributed to the growth of the sector and farmer incomes in Brazil, despite high costs of inputs (Sedibe and Mulaudzi, 2023). Contrasting situation could be seen in Argentina, stable high prices plus the low costs of production were very strong economic incentives to boost the agricultural sector and became one of Argentina's top exports (World Bank, 2021).

Access to loans for farming is a frequently cited problem in literature, in Indian, it has been indicated that farmers who lack credit supply use less inputs (30-50% lower amount of fertilizer usage) compare with those with the availability of official bank and related loans (Kassie et al., 2021). The yields of national Soyabeans grew from 1.2 tons/hectare to 1.9 tons/hectare in China between 2000 and 2020 as result of the financial support provided by the government to small farmers, which enables them to buy better inputs, such as seeds and fertilizer (World Bank, 2022).

2.3.2 African Perspective

For African smallholders, these financial constraints are especially severe. First, credit availability: a primary constraint is access to affordable credit as most smallholder farmers are unable to afford purchased inputs, which can increase productivity, without it (Sedibe and Mulaudzi, 2023). Only fewer than 15% of Tanzanian soyabean smallholder farmers had access to formal agricultural credit, with the majority relying on informal creditors who charge interest rates as high as 30-50% per year, or a personal savings too small to be productive (Kassie et al., 2021). A typical price-cost squeeze situation in Nigeria: while certified seeds sell for 3.00-4.50 USD/kg, the farm gate price of crop yield stands only between 0.30-0.50 USD/kg, a discouraging situation that undermines

farmers' incentives to invest in quality seeds (Mutenje and Mlambo, 2023). A distance-to-market penalty was found inGhana,where farmers beyond 10 kilometers to output markets earned 15-25% less than those who were located closer to town (Davis et al., 2022). In Malawi, the critical importance of economic support for continued use of inputs is demonstrated by the abolishment of fertilizer subsidies that resulted in a 40% drop in input application rate and a 35% fall in yields in the concerned districts (Mabhaudhi et al., 2023).

2.3.3 Southern African Perspective

Southern Africa suffers from the same economic difficulties as the rest of the continent, though aggravated by the structural market failures(Omondi & Bahta 2024). Soyabeans are generally less attractive to many smallholders than other crops such as maize or tobacco due to the high cost of inputs and relatively low returns. For instance, in Zambia, certified seeds cost between 2.50 – 4.00 dollars per kg, and use of phosphorus is much below the recommended rate (Mabhaudhi et al. 2023). In Mozambique, the increase in Soyabean production has occurred predominantly due to increases in planted area, and not yield growth. The lack of investment in technology and inputs continues to be an issue (Chikowo et al. 2022). In Zimbabwe, instability in producer prices during the last few seasons (which have varied between 350 – 550 dollars per tonne) leads to uncertainty in production planning, thus affecting further expansion in area (Tumbure & Mutenje 2025).

2.3.4 Zimbabwean Context

At all stages, there are quite significant limitations to soyabean production within Zimbabwe's economic environment. When all costs for inputs, including seed, fertilizer, fuel, and hired labour are considered soyabeans lose out to higher profit producing cash crops such as tobacco. Additionally, an unstable producer price environment dampens incentives to invest (Tumbure and Mutenje, 2025). There are significant limitations to the availability of formal agricultural credit especially for smallholders who do not often possess adequate collateral to support loans from commercial institutions (ZIMSTAT, 2025). The results of field data collection from Guruve District show that in the last season, only 36.3% of the smallholder soyabean farmers received some kind of agricultural credit the remaining had to rely on informal credit with higher interest or on their savings (Field Survey Data, 2026). Cumulatively these economic constraints led Zimbabwe to be importing about 70% of the total yearly demand of domestic soyabeans (Tumbure and Mutenje, 2025).

2.4 Institutional Factors Affecting Soyabean Production

2.4.1 Global Perspective

Soyabean yield gains depend critically on institutional frameworks such as markets institutions, government policies, extension systems and input supply systems (World Bank, 2021). The Brazilian EMBRAPA extension network that reaches 2 million+ farmers each year is one of the most cited success institutional systems. Extension contact increases the probability of technology adoption between 40-60% (Davis et al., 2022; Kassie et al., 2021). Similarly marketing and input supply systems in Argentina that yields are around 3 tons per hectare. It is worth mentioning that generally, yield of Soyabean is higher in countries with good institutional systems by two to three times than those with poor institutional environments (Mabhaudhi et al., 2023).

2.4.2 African Perspective

Weak institutions restrict agricultural development in Africa; weak and underfunded extension services, unstable government assistance and poor input delivery systems further weaken the efficacy of policy in agriculture(Sedibe and Mulaudzi, 2023). The Tanzania farmer-to-extension ratio stands at more than 1,500:1 which is three times more than the recommended upper limit of 400:1 hence most of the small holder soyabean farmers are cut off from useful technical advice(Davis et al., 2022). Despite having an formal extension cadre in Nigeria of more than 20,000 people, limited money and time to visit farmers limit the amount of assistance farmers receive to just one or two visits per farming season which means that extension in the region has limited impact (Mutenje et al., 2024). In Malawi farmers delayed government sub delivery has resulted in missing the optimal planting season and causedsoyabean yield loss of 20-30%(Chikowo et al., 2022).

2.4.3 Southern Africa Perspective

Constraints of an institutional nature are prevalent across Southern Africa, partly because agricultural policy has, to date, tended to focus on cereals to the neglect of legumes (Mabhaudhi et al. 2023). Public expenditure on extension services for Soyabeans constitutes less than 5 percent in Zambia and despite the crop's growing commercial significance, government support through subsidies and advice has been focused on maize (Mutenje et al. 2024). In areas of Mozambique the ratio of farmers to extension agents is over 2,000:1 and large numbers of Soyabean producers operate without any technical advice during the cropping season. It is partly because of this that

actual yields are far below three tonnes per hectare under optimal management conditions, averaging at 0.8-1.2 tonnes per hectare (Mutenje et al. 2024). Compounding the problem are security of tenure concerns. Studies conducted in Malawi and Zambia clearly show that farmers with secure access to land are significantly more likely to use higher inputs of fertilizer, resulting in significantly higher Soyabean yields compared to those without formal rights to use their land (Mabhaudhi et al. 2023; Mutenje et al. 2023).

2.4.4 Zimbabwean Context

Institutional failures are prevalent in Zimbabwe's soyabean industry. On average, only 1-2 advisory visits are given to smallholders per season-inadequate to meet their technical learning needs if they are to achieve any significant increase in yields (Tumbure and Mutenje, 2025). According to survey findings, while 56.9% of farmers surveyed in Guruve District have some level of contact with extension services, the extent of their access is strongly correlated with proximity to the Agritex office farmers located 10+km away received less than half the visits of closer farmers (Field Survey Data, 2026). Most smallholders do not have access to formal loans either due to the poor availability of credit for agriculture and because the high commercial interest rates are set at 15-25% (World Bank, 2022). Even market-side institutional failures contribute to the reduced profitability of soyabean production- informal price controls, a lack of competition among buyers and payment delays contribute to a disincentive to expand production (ZIMSTAT, 2025). Only about 25% of smallholder soyabean farmers receive payment within 2 weeks of delivery, with others waiting between 1 and 6 months to receive their payment (Mutenje et al., 2024). The empirical value of institutions is shown clearly in Guruve District-with the presence of formal extension, a soyabean farmer will receive about 0.5 tons more yield per hectare than a farmer without access to formal extension (Field Survey Data, 2026).

2.5 Strategies to Improve Soyabean Production

2.5.1 Global Perspective

Good regulatory frameworks, efficient markets and technology innovation drove productivity gains in global soyabean production (World Bank, 2021; FAO, 2022). Brazil's national average yields grew from 1.5 to 3.4 tonnes per hectare during 1990-2020 with major infrastructure development to address high transportation costs and post harvest losses, progress with tropical varieties, the implementation of no-till systems, and consistent public investment in agricultural

research (Sedibe and Mulaudzi, 2023; World Bank, 2022). Biotechnology and precision agriculture were deployed in the USA to push yields up from 2.3 to 3.5 tonnes per hectare over the same period, supported by institutional mechanisms that funded research and extension, including the Soyabean Checkoff Program (FAO, 2022; Davis et al., 2022). Technology diffusion combined with deliberate policy instruments, including the widespread application of commercial inoculants for nitrogen fixation, and differentiated export taxation to foster internal processing helped Argentina increase its productivity (Sedibe and Mulaudzi, 2023).

Essential elements of global best practices for soyabean improvement are: introduction and widespread diffusion of high-yielding, climate-resilient varieties of seed; expanded use of mechanization and precision farming; increased efficiency of extension services and digital advisory; transparent market pricing along well-integrated value chains; and public-private collaborations for input supply and market coordination (World Bank, 2021; FAO, 2022; Kassie et al., 2021).

2.5.2 African Perspective

African soyabean improvement has been hindered by various structural problems with smallholder production: a lack of access to improved inputs, poor human capital and weak institutions (Arajo and Chibwana, 2025). Combining improved seed varieties with rhizobium inoculants was found to be cost effective, universally applicable and decreased the use of N-fertilizers by using the biological N-fixation power (FAO, 2022). In Nigeria the Soyabean Value Chain Development Program improved certified seed availability from 2,000 to 15,000 tonnes per year, while average yields rose from 0.8 to 1.8 t/ha in five years, due to subsidies, extension and market access (Mutenje et al., 2024; World Bank, 2022). Contact with extension services was found to increase the likelihood of adopting improved practices by 2.5 times (Kassie et al., 2021). Soil fertility management programs in Ghana resulted in 30–50% yield increases while village level oil presses in Uganda led to 15-20% increased farm-gate price, making the cultivation of soyabeans economically more attractive (Omondi and Bahta, 2024).

2.5.3 Southern Africa Perspective

Irrigation development, conservation agriculture and enhanced extension services were among approaches used by development programs in Southern Africa, aimed at both reducing dependence on imports and raising agricultural productivity (Omondi and Bahta, 2024; Mabhaudhi et al.,

2023). The figures from technology impact assessments conducted in Malawi, Zambia and Mozambique are impressive. Alone? Just the inoculants give about a 24% yield increase. Add phosphorus with the inoculants, and you get an almost 89% increase. Certified seed outyields saved seed by 35-50% of certified. Even more convincing, timely planting over delayed planting resulted in yield increases as high as 300% (Chikowo et al., 2022; Mabhaudhi et al., 2023).

Evidence from Zambia's Soyabean Innovation Lab shows that there is value in a concerted effort. Yield increases of 0.5 to 1.0 tonnes per hectare resulted from variety development, farmer training and a public-private partnership that provided input and marketing support (Mutenje et al., 2024). An integrated value chain project in Malawi reached more than 100,000 smallholder farmers and resulted in average yields of 0.9 to 1.5 tonnes per hectare (Chikowo et al., 2022).

2.5.4 Zimbabwean Context

The development strategy of Zimbabwe's soyabean sector has included the reduction of supply side constraints by increasing planted area and yields, alongside overcoming structural weaknesses through improving markets and extension delivery (ZEPARU, 2018). Subsidized seed and fertilizer is provided to smallholder farmers growing soyabeans under the Presidential Input Support Scheme (Mutenje and Mlambo, 2023). Contract farming with companies such as Seed Co, National Foods, Surface Investments and Cargill targets input, finance and marketing aspects simultaneously, supplying seed and inoculants, fertilizers and technical assistance and receiving guaranteed quantities at pre-agreed prices (Tumbure and Mutenje, 2025). In Guruve District representatives of buyers have facilitated some market links, training sessions were conducted by Agritex officers and subsidized inputs distributed, however implementation issues have reduced the overall impact including delayed input delivery, inconsistent training coverage and delayed payment by buyers (Mutenje and Mlambo, 2023). The use of improved seed varieties, inoculants and access to extension services are key determinants of productivity under smallholder conditions in Zimbabwe; thus strengthening extension services is expected to lead to large gains (Tumbure and Mutenje, 2025). Stable producer prices and development of small-scale drip irrigation are also receiving policy attention (Ministry of Lands, Agriculture, Fisheries, Water and Rural Development, 2024). However, an average yield that is 1.2-1.6tonnes/ha far from the potential of >3 tonnes/ha persists due to structural constraints like high input prices, lack of access to credit and weak market institutions (World Bank, 2022).

2.6 Strategies and Policies Implemented Globally

The global growth in soyabean production has not occurred by chance. Long-term investments in institutions, coordinated public private efforts and deliberate government interventions has driven success in most producing countries (World Bank, 2021). The approaches used in major soyabean producers and being adopted in Zimbabwe hold lessons for districts such as Guruve.

International policy approaches for major producers

Brazil is a key example of policy-driven soyabean production. Between 1990 and 2020, Brazil, which in 1990 was a marginal soyabean producer producing around 1.5tonnes/ha average yield (Sedibe and Mulaudzi, 2023), received substantial public investment into agricultural research by EMBRAPA (state owned agricultural research corporation). The use of tropical Soyabean varieties adapted to low latitude conditions and thought previously impossible; public investment in infrastructure (roads, rail and ports) to decrease high transfer costs from the interior to the port, encouragement of the no-till system and subsidized credit to small and medium enterprises farmers (FAO, 2022). This lead to an increase in national average yield to 3.4tonnes/ha and a dominance of soyabean exports by Brazil in 2020 (Sedibe and Mulaudzi, 2023). Brazil has in more recent times cemented a relationship with China as the main export market; Brazil's state owned and private actors have developed a tailor-made soyabean supply chain adapted to Chinese quality and sustainability standards while China has financed transport infrastructure roads, ports and storage, the largest soyabean storage and processing plant in South America located in Santos port is now owned by Chinese conglomerate COFCO (USDA, 2025). The vertical integration between producer country and huge consumer country shows how far a strategic relationship could reach. Argentina has a different approach; where there is a strong use of commercial inoculants to achieve biological N fixation thereby lowering dependence on synthetic N fertilizer (Sedibe and Mulaudzi, 2023) along with differential export tax policy to encourage the export of value added products such as soyabean oil and meal rather than crude beans (World Bank, 2021) and make Argentina a leading producer and exporter of soyabean meal and oil. In early 2025 Argentina relaxed export taxes for a wide range of agricultural commodities, including soyabeans in an attempt to lower input costs for farmers and boost global competitiveness (USDA, 2025), though a marginal reduction in the area planted with soyabeans is expected due to a rotation to maize (USDA, 2025). A third model of the United States economy uses a privately driven industry supported by

institutional setup, through the Soyabean Checkoff Program which uses mandatory contributions from farmers for research, promotion and education of new biotechnological traits, improved seed and precise agriculture techniques (FAO, 2022) leading to a rise in national average yield from 2.3 to 3.5tonnes/ha between 1990 and 2020 (FAO, 2022), making it the second producer with 36million hectares (USDA, 2025). Trade with China from 2018 has posed the most significant problem through tariffs on US soyabeans, which have seen China increasingly buy from Brazil and invest heavily in its soyabean value chains, significantly diminishing US access to its main export market; therefore the USsoyabean industry is striving to diversify its markets towards countries such as Central America, Egypt, Vietnam, Indonesia and parts of Africa (USDA, 2025). A final case is India; which had a projected output of 13.66million tonnes in 2025 with a national average yield of 1.17tonnes/ha (USDA, 2025). India decreased its import tax on crude soyabean oil from 20% to 10% in May 2025 to try to stabilise domestic prices of edible oil, although the policy impact on farmers growing oilseeds and incentives is uncertain (USDA, 2025) thereby emphasizing that stability in government policy in the sector is a crucial aspect for ensuring private sector investment (World Bank, 2021).

2.6.1 Zimbabwe's Policy and Strategy Framework

Zimbabwe has realized the prohibitive cost and strategic vulnerability of relying on imports for roughly 70% of its annual Soyabean demand (Tumbure and Mutenje, 2025). The government has accordingly implemented a raft of policies and programs aimed at increasing local production, improving value chain linkages, and reducing import dependency (Ministry of Lands, Agriculture, Fisheries, Water and Rural Development, 2024).

Import substitution and local content requirements: The most substantial recent policy development is the amendment of the Agricultural Marketing Authority (grain, oilseed and products) by-laws, through Statutory Instrument 87 of 2025 (Government of Zimbabwe, 2025). This instrument prohibits imports of grain and oilseeds, including soyabeans, except in specific limited cases (Government of Zimbabwe, 2025). Crucially, it imposes binding local procurement targets; starting April 1, 2026, processors such as millers, stockfeed producers, and edible oil refiners must procure at least 40% of their annual raw material needs locally. By April 1, 2028,

this requirement increases to 100% (Government of Zimbabwe, 2025). To protect local farmers from cheap imports undercutting domestic prices, the same instrument establishes two pricing benchmarks: the import parity price and the production parity price. The import parity price reflects the cost of importing the product to Zimbabwe including transport and insurance, while the production parity price is based on the cost of local production (Government of Zimbabwe, 2025). If the price of imports falls below the local production parity level, the difference is to be deposited into an Agricultural Revolving Fund to compensate domestic farmers and insulate them from price shocks (Mugano, 2025). Professor Gift Mugano (economist) stated that the move is expected to achieve food security, create jobs, save foreign currency, and aid the transition to a single-currency regime (Mugano, 2025). Zimbabwe has historically spent approximately US$500 million annually on cereal imports, and over US$2 billion on all agricultural imports, most of which could be domestically produced (Mugano, 2025).

The Presidential Input Support Scheme: This program, targeted at smallholder farmers, provides subsidized seed and fertilizer to encourage their participation in production of strategic crops, including soyabeans (Mutenje and Mlambo, 2023). Under the 2025/2026 summer cropping plan, the program will support the cultivation of soyabeans, along with maize, sorghum, pearl millet, sunflower, groundnuts, and sugar beans (Ministry of Lands, Agriculture, Fisheries, Water and Rural Development, 2025). Recipients are required to give a portion of their yield to sustain future production (Mutenje and Mlambo, 2023).

Contract farming and private sector coordination: The government has also encouraged contract farming as a strategy to address multiple constraints (Tumbure and Mutenje, 2025). Companies such as Seed Co, National Foods, Surface Investments, and Cargill have been entering into contracts with smallholder farmers to provide certified seed, inoculants, fertilizer, and technical expertise, in return for an assured delivery at pre-arranged prices (Tumbure and Mutenje, 2025). The Food Crop Contractors Association (FCCA) is notably active in facilitating Soyabean, maize and sorghum contracts (FCCA, 2024). Similarly, the Oil Expressers Association of Zimbabwe (OEAZ) has also provided contract agreements for farmers, and facilitated market access for those self-financing their own crops (OEAZ, 2023). Between the 2021/22 and 2022/23 seasons, the area

planted to Soyabean in Zimbabwe increased from 46,158ha to 55,944ha and total output from 82,028 tons to 93,086 tons (ZIMSTAT, 2024). This has led to savings in import costs, reducing spending on Soyabean product imports by US$103 million between 2022 and 2023, a 28% decrease in total Soyabean product imports (ZIMSTAT, 2024).

Infrastructure and processing investments: Foreign direct investment in the Soyabean value chain is also playing a role. In June 2022, the government commissioned a US$20 million edible oil refinery in Mahusekwa, Mashonaland East, owned by the Tanzanian firm Mount Meru Millers (Herald, 2022). The refinery, capable of processing 250 tons of Soyabean oil daily, has indicated potential investments totaling US$100 million in Zimbabwe and the creation of up to 1000 jobs (Herald, 2022). Traditional leaders in the area claim farmers are turning to soyabean cultivation because the refinery provides a reliable market for their produce (Herald, 2022).

Irrigation and mechanization expansion: The government's 2025/2026 summer cropping plan also emphasizes increased use of irrigation and mechanization (Ministry of Lands, Agriculture, Fisheries, Water and Rural Development, 2025). Key objectives include the drilling of 3,945 boreholes for village business units, the development of 15,000 new hectares of irrigated land to bring the total to 232,000 hectares, and the deployment of 15,576 tractors, 3,100 planters, 334 combine harvesters and 90 commercial dryers (Ministry of Lands, Agriculture, Fisheries, Water and Rural Development, 2025). While current mechanization levels among smallholders remain low (only 12% of Soyabean farmers in Mashonaland Central have access to tractors or draft power), the government is actively working to scale up these investments (Tumbure and Mutenje, 2025).

Agricultural financing programs: The National Enhanced Agriculture Productivity Scheme (NEAPS) supports 45,000 hectares of crops including maize, soyabeans, traditional grains and sunflower (AFC, 2025). This scheme, supported by government guarantees through the Agricultural Finance Corporation (AFC), CBZ Bank, and NMB Bank, aims to produce 247,000 metric tons (AFC, 2025). The private sector (FCCA) is contracted to finance an additional 17,000

hectares of soyabeans (FCCA, 2025). However, access to formal agricultural credit remains a major constraint for smallholder farmers. Only 35.8% of farmers in Guruve District had any form of access to credit in the most recent season (Field Survey Data, 2026) and, with commercial interest rates at 15-25% (World Bank, 2022), most farmers cannot afford these loans. Although the Presidential Input Scheme is designed to provide affordable inputs, farmers often complain about late distribution, leading to delayed planting (Mutenje and Mlambo, 2023).

2.7 Theoretical framework

A solid theoretical foundation guides the selection of variables, the formulation of hypotheses and the way empirical results are interpreted. This study combines two theoretical perspectives: the Cobb-Douglas production function and the broader neoclassical approach to production. Together, these frameworks offer a well-rounded understanding of how farmer characteristics, resource endowments, technology adoption and institutional arrangements shape soyabean production and productivity in Guruve District.

1 x 1 Neoclassical Production Theory (Production Function)

The neoclassical production framework by Alfred Marshall conceptualises output as a function of inputs and technology. In agricultural contexts, production (Y) is typically expressed as a function of land (L), labour (N), capital or farm inputs (K), including seed, fertilizer and inoculants and technical efficiency (A):

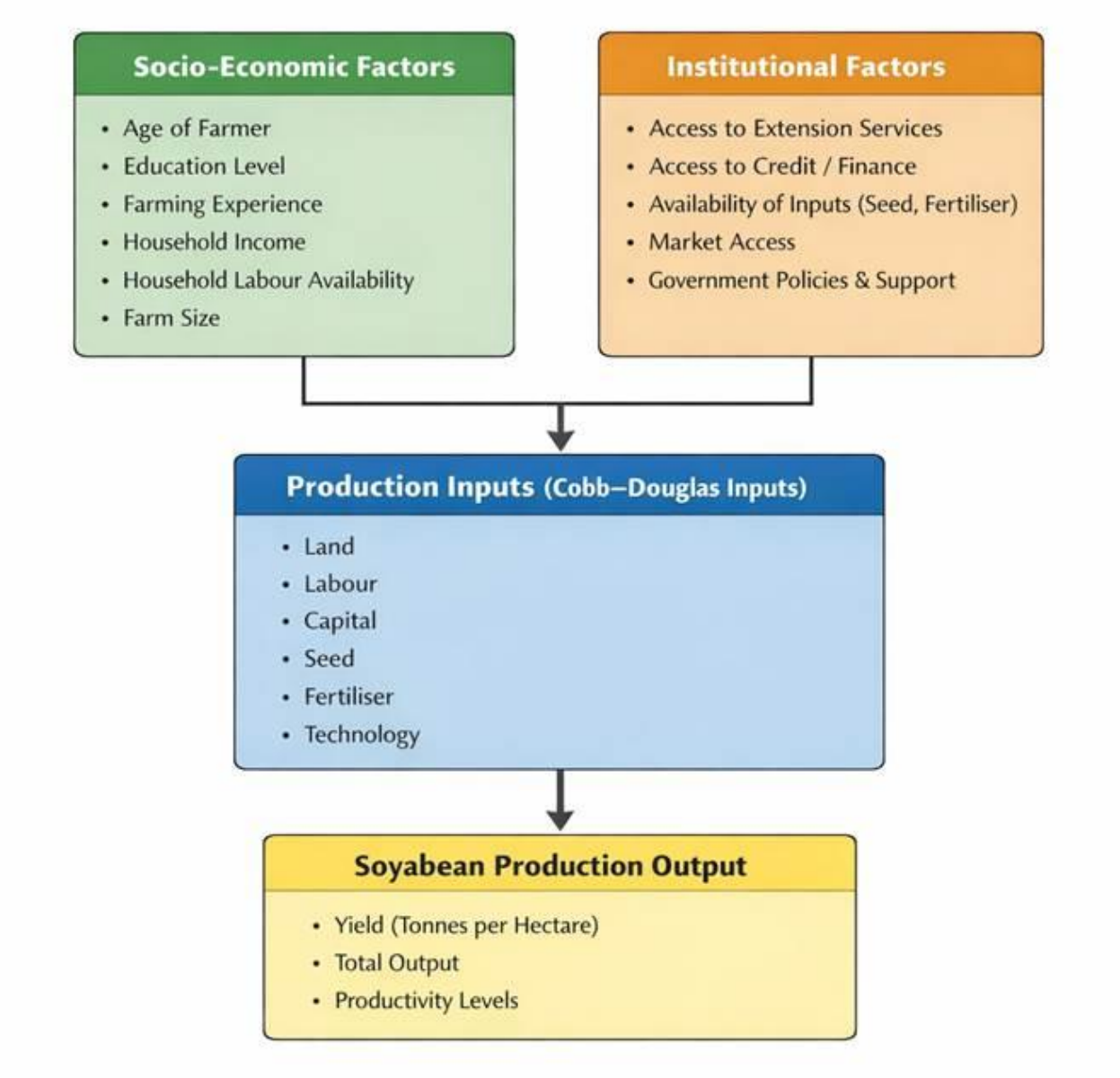
1 Y = f (L, N, K, A)

One empirical model that is most used is the Cobb-Douglas production function. This was first proposed by Charles W Cobb and Paul H Douglas in 1928. The theory permits the calculation of elasticities of production with respect to each factor input. In this study, the production function is used to specify the choice of observable inputs, namely farm size, labour availability, use of certified seed, use of fertilizers and mechanisation, and the choice of observable output measures, namely yield and total production. One explanation for why there might be a shortage of an aggregate output such as national production relative to aggregate demand lies in inefficient or sub-optimal use of inputs, inappropriate adoption of technology and constraints to the accumulation of factor inputs, in a neo-classical paradigm. This argument resonates with the low levels of input utilization and use of saved seed observed previously in Zimbabwe (GoZ, 2015).

The theories are relevant for various reasons. Neo-classical production theory is the most relevant as it provides an explanation on how an output is produced via optimal combination of production inputs under scarcity of resources. It assumes producers are striving to maximize their profits and output through the efficient allocation of resources like land, labour, capital and technology (Varian, 2019). It is relevant in this study due to its emphasis on factor productivity and competency. The study uses neo-classical theory to investigate how the inputs-use efficiency and output of soyabean among smallholders in Guruve District is affected by the socio-economic and organizational characteristics differences. Through this theory the causes of production inefficiency could be identified. The constraints like limited access to finance, extension services and lack of efficient market institutions may not permit farmers to operate at optimum production levels (Ellis, 2018).

The Cobb-Douglas theory is relevant in this study as it is important to estimate and ascertain how some of the main production inputs such as land size, labour, seed, fertilizer, capital investment and access to extension services affect the output level of soyabean production in Guruve. These variables could be incorporated into the model and respective contributions to soyabean production estimated (Gujarati and Porter, 2018). Another reason why Cobb-Douglas is relevant is due to the examination of returns to scale in the agricultural sector. The addition of the predicted factor input elasticities yields the overall degree of returns to scale (constant, increasing, decreasing) in agricultural production (Gujarati and Porter, 2018). The concept of returns to scale is particularly relevant to smallholders, who are often hampered by limits of scale. The use of Cobb-Douglas theory is compatible with inclusion of socio-economic and institutional factors in production function as shift parameters of the technological change or as substitute for technology efficiency difference between farmers (Varian, 2019). By incorporating the socio-economic and institutional factors like education level, experience, access to credit, extension services and market access, the Cobb-Douglas production function becomes comprehensive in establishing the association between the factors and output levels (Sadoulet and de Janvry, 2018).

2.8 The Conceptual Framework



Source: This conceptual framework is my own work.

This framework is my own conceptualisation based on Neoclassical Production Theory and the Cobb-Douglas production function. Socio-economic factors influence a farmer's ability to access, combine and use production inputs efficiently. Education and experience enhance a farmer's ability to adopt improved agronomic practices, while household income and labour availability determine the ability to buy inputs and undertake timely farm operations. Farm size influences the

scale at which production inputs can be applied efficiently. The factors shape how farmers access and utilise production resources.

Institutional factors, including access to extension services, credit facilities, input supply systems, market access and government support policies, affect a farmer's ability to purchase and effectively use production inputs. Extension services are there to facilitate the exchange of knowledge, for example, technical knowledge, credit allows farmers to purchase inputs such as quality seeds and fertilizers and market access provides price incentives that influence production decisions.

Production inputs and soyabean production outputs, as determined by yield (tonnes per hectare), total output and productivity levels, are connected by the final linkage. According to the Neoclassical theory, the quantity and effectiveness of inputs used determine the output. Soyabean output is impacted by variations in institutional support and socioeconomic circumstances, which have an impact on input productivity and level.

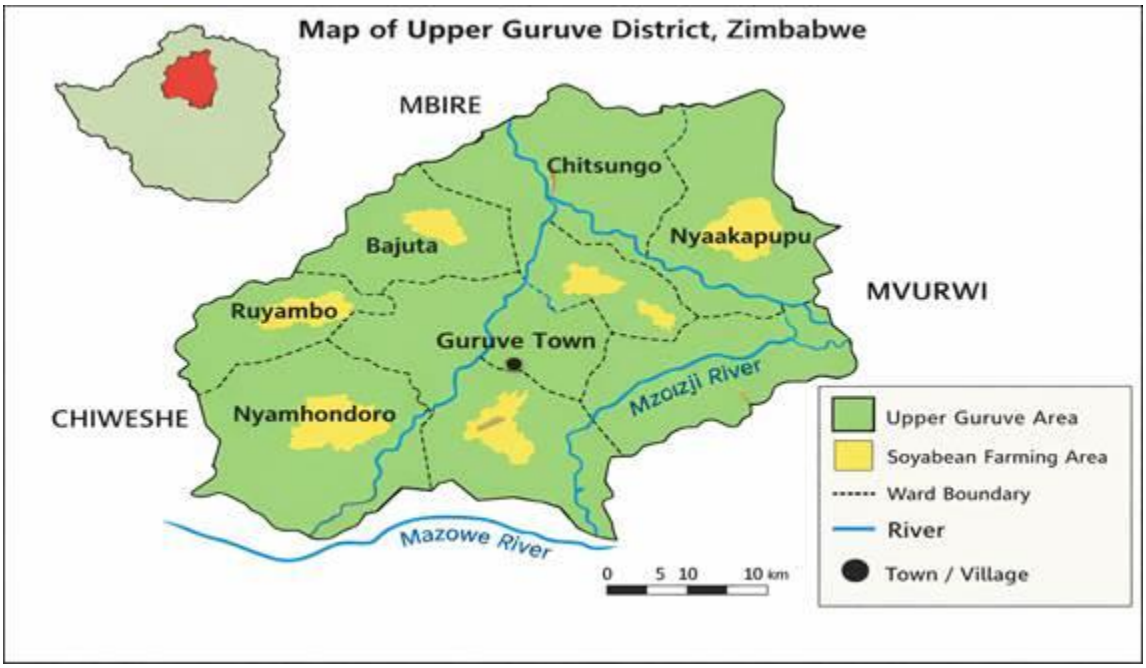
CHAPTER 3: Research Methodology

3.1 Research Design

In this study, both qualitative and quantitative methods were used. The study utilised a cross-sectional survey approach, in which data were collected at a particular moment in time to analyse the social and economic aspects impacting soyabean output among farmers. To get a complete picture, the survey asked both qualitative and quantitative questions. To investigate the variables under study, survey research involved gathering and evaluating data from a representative sample of the population using questionnaires.

3.2 Study Area

About 80 kilometres from Harare, in Guruve District, Mashonaland Central Province, the study was conducted. The district was chosen because it is known to be suitable for growing soyabeans because it is located in Zimbabwe's Natural Region 2, which has an average annual rainfall of about 843 mm (Food and Nutrition Council, 2022). Guruve District is a productive location for smallholder soyabean farming, enabling both food security and revenue production in the region due to the combination of sufficient precipitation, ideal temperatures and generally fertile soils.



SOURCE: Google Maps

3.3 Sample Size and Sampling Techniques

Because of its well-established soyabean production and the availability of relevant respondents, Guruve District was purposively selected as the study region. Smallholder soy farmers in particular district wards made up the target group. Records from local Agritex offices indicate that there were an estimated 102 soy farmers in these districts.

Smallholder soy farmers in particular Guruve District wards made up the target group. Records from nearby Agritex offices indicate that there were approximately 102 soy farmers in these districts.

The Yamane (1967) formula, often known as the Slovin formula, was used to calculate the sample size for the study's quantitative component:

Where:

n = sample size

N = population size, e = level of precision (sampling error), which was set at 5% (0.05)

Substituting the values:

Therefore, the calculated sample size was approximately 81 farmers. For practical purposes, the sample size was rounded to 81 respondents for the questionnaire survey.

Ward selection was carried out using purposive sampling. This method was selected because of its advantages, including a high likelihood of selecting those with highly relevant data to the matter under study and its lower time-consuming nature. A simple random sampling technique was employed to select households, ensuring that all farmers had an equal opportunity to participate in the study.

A smaller sample size was employed for qualitative components of the study. This included key informants and focus group discussions (FGDs). Approximately 15–20 participants were selected for qualitative data collection, including extension officers, lead farmers and experienced soyabean producers. These participants were purposively selected for their knowledge and experience in soyabean production.

The required data were collected from local Agritex Offices and the selected farmers.

3.4 Data Collection Method

Both primary and secondary data collection methods were used in the study. Data was gathered through questionnaires, focus group discussions and questionnaire-based interviews.

3.5 Data Analytic Framework

For data collection, both secondary and primary methods will be employed. There will be use of questionnaires, focus group discussions and questionnaire-based interviews.

Research Objectives	Variable	Analytic Tools
To analyze the trends in soyabean production in Zimbabwe	Total annual soyabean production (hectares, metric tons) at the national/ provincial level Average soyabean yield (tons/hectare) over time Area under cultivation	Trend analysis and descriptive statistics (time series graphs and charts) Calculation of annual growth rates
To profile the socio-economic factors that influence soyabean production in Zimbabwe	Inferential statistics: Chi-square tests to examine associations, e.g., access to credit. To assess institutional constraints that affect soyabean yield, Institutional/ Market variable: distance to nearest input supplier or output market	Descriptive statistics: frequency, mean, standard deviation Inferential statistics: Chi-square tests to examine associations, e.g., access to credit
To assess institutional constraints that affect soyabean yield	Institutional/ Market variable: Distance to nearest input supplier or output market Type of buyer contact (private, government, informal) Access to extension services	Descriptive and Comparative analysis. Inferential statistics: correlation analysis to link institutional factors, e.g., market access, to yield

To evaluate the practical strategies and policies that are developed to improve soyabean production	Awareness and participation in existing extension programs, e.g., input schemes. Data source: Questionnaire responses, FDGs	Gap and SWOT analysis to compare policy objectives Descriptive Statistics: percentage of farmers who are aware of or benefit from specific programs

3.5.1 Analytical Framework

Data on socio-economic and institutional variables such as age, gender, level of education, marital status, farm size, household size and soyabean production levels were collected, cleaned, coded, Summarizedand organized using SPSS software. The analysis generated descriptive statistics, including mean production levels across numerous farmer groups and frequency distributions describing respondent characteristics. Some measures of central tendency were used as the main descriptive indicators for all study variables. The study employed analytical techniques such as descriptive statistics, the Moving Average model and regression analysis.

3.5.2 Diagnostic test for the regression model

3.5.2.1 Multicollinearity Test

To assess multicollinearity in the regression model, the researcher conducted a VIF test in SPSS. In simple terms, multicollinearity occurs when two or more independent variables in a model are closely related (Hair et al., 2019). Essentially, it measures the degree to which the explanatory variables within an econometric model are dependent on one another.

This is a concern worth addressing because multicollinearity can compromise the model's integrity in several ways. It tends to widen confidence intervals, produce inefficient estimates with inflated variances and covariances and ultimately make it harder to obtain reliable results through Ordinary Least Squares (OLS) estimation (Brooks, 2019). On top of that, multicollinearity often drives down t-ratios on the coefficients, which increases the risk of committing a Type II error, meaning the researcher might fail to reject a hypothesis that is actually false (Field, 2018).

3.7.3.2 Heteroscedasticity Test

One of the core assumptions of the classical linear regression model is that the error terms are homoscedastic, meaning they all share a constant variance (Williams et al., 2013). Put simply, this

assumption requires that the variance of the dependent variable remain stable and be unaffected by the independent variables. When this assumption is violated, the consequences can be significant, including higher Type I error rates and reduced statistical power (Rosopa et al., 2019).

The researcher employed the graphical method to investigate the presence of heteroscedasticity in the model. Error variances that are uneven across observations are known as heteroscedasticity (Hayes & Cai, 2017) and they usually result from outliers or advancements in data gathering techniques. The estimators stay unbiased but lose their minimum-variance property when heteroscedasticity is present in a model, which means they are no longer considered Best Linear Unbiased Estimators (BLUE).

3.7.3.3 Autocorrelation Test

A fundamental assumption of the classical linear regression model is that the disturbance term of one observation should have no bearing on the disturbance term of another (Asteriou & Hall, 2016). Autocorrelation is defined as the correlation between observations in a time series or cross-sectional data and when it is present, it can seriously undermine the validity of regression results (Brooks, 2019).

To test autocorrelation, the Durbin- Watson (D-W) was employed, as it remains one of the most widely recognized and reliable tools for this purpose (Asteriou & Hall, 2016). A D-W value of approximately 2 indicates no autocorrelation, while values closer to 0 suggest positive correlation and values approaching 4 indicate negative correlation (Brooks, 2019).

3.7.3.4 Test for Linearity

When applying linear regression analysis to explore relationships between variables, it is assumed that a linear relationship exists between the independent and dependent variables (Field, 2018). Testing for linearity is a critical step because correlation, regression and other members of the general linear model family all rest on this assumption. To assess whether a non-linear model offers a significantly better fit than a linear one, an F-test or R-squared difference comparison between models can be applied (Hair et al., 2019). In addition to these statistical approaches, a graphical method was employed to assess the linearity of the regression model visually.

3.7.3.5 Normality Test

A test for normality should be carried out in order to determine whether the residuals of the response variable are approximately normally distributed about their mean (Field, 2026). If it is, it

will be possible to utilize parametric statistics and inferential procedures that are based on this assumption. If a variable does not pass a test for normality it should be investigated further, for example a check of the histogram and the normal probability plot should be performed to see if there is an outlier that is forcing the deviation from normality. It is an important assumption of a regression model to test for normality as it ensures that the t-statistics calculated for each independent variable are able to be used to assess whether the independent variable is a significant predictor of the response variable. In addition, if residuals were truly normally distributed with a mean of zero, the histogram should look like a bell curve (Field, 2026).

It was through a visual method that normality was tested to ensure that the assumption of normal residuals was not violated.

3.8 Institutional Challenges Affecting Soya Bean Farmers

3.8.1 Descriptive Statistics

The descriptive statistics approach was applied in the analysis of the institutional factors influencing the production of Soyabean. It is one of the most advantageous methods as it is easy to implement and provides relatively simple yet effective summaries of complex data. The measures involved include average values, frequencies, and percentages that are easily understood (Saunders et al., 2019). Descriptive statistics also provides measures to determine the standard deviation of the variables. It is also true that the method has some limitations: descriptive statistics fail to indicate the relationship between variables and the influence of randomness, and also the mean would serve as a poor estimate of central tendency when the data is heavily skewed. The techniques involve measures of central tendency (e.g. Mean and median) and variability (e.g. Standard deviation) (Saunders et al., 2019). The standard deviation (the square root of the variance) was used as a measure of variability of the data. The mean indicated the typical value of each variable and percentages provide an effective means of disseminating statistical results

3.6 Ethical Considerations

All information gathered throughout the course of this research study was kept in strictest confidence and the anonymity of each participant was preserved. It was on a voluntary basis that the respondents took part and they were allowed to leave the study at any stage they wished with no penalties. The study was granted ethical approval by the local authority and the ethics committee at the university which thus permitted for it to be conducted

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

This chapter discusses and analyses the findings of the study, examining the effect of institutional and socioeconomic factors on soyabean production in Guruve District. Based on data obtained through focus group discussion, interviews and questionnaire survey the discussion follows the objectives of the study stated in Chapter one. Both descriptive and inferential statistics are used in a holistic explanation of the factors encouraging or inhibiting production.

4.1 Response Rate

Smallholder soy farmers in particular Guruve District wards made up the study's target population. The total projected number of soyabean farmers in these wards was N = 102, according to data gathered from local Agritex offices. Using the Yamane (1967) formula, the sample size was determined as follows:

$N = n / (1 + Ne^2)$

where e is the margin of error (0.05), n is the sample size and N is the population size (102).

Substitution: $n = 102 / (1 + 102 \times 0.05^2) = 102 / (1 + 0.255) = 102 / 1.255 \approx 81$

As a result, 81 responders made up the computed sample size. A total of 95 questionnaires were given to soyabean farmers chosen from different Guruve District wards in order to account for any non-responses. Eighty-one of the ninety-five questionnaires were completed and returned. The remaining 14 questionnaires were not returned.

Table 4.1: Response Rate

Category	Frequency	Percentage (%)
Questionnaires distributed	95	100
Questionnaires returned	81	85.3
Unreturned questionnaires	14	14.7

Source: Field Survey Data (2026)

In social science research, an 85.3% response rate is considered excellent. Any rate higher than 70% is typically regarded as appropriate and sufficient for trustworthy statistical inference, as Creswell (2018) points out. This level of participation reduces the risk of non-response bias and enhances the validity and reliability of the study's conclusions.

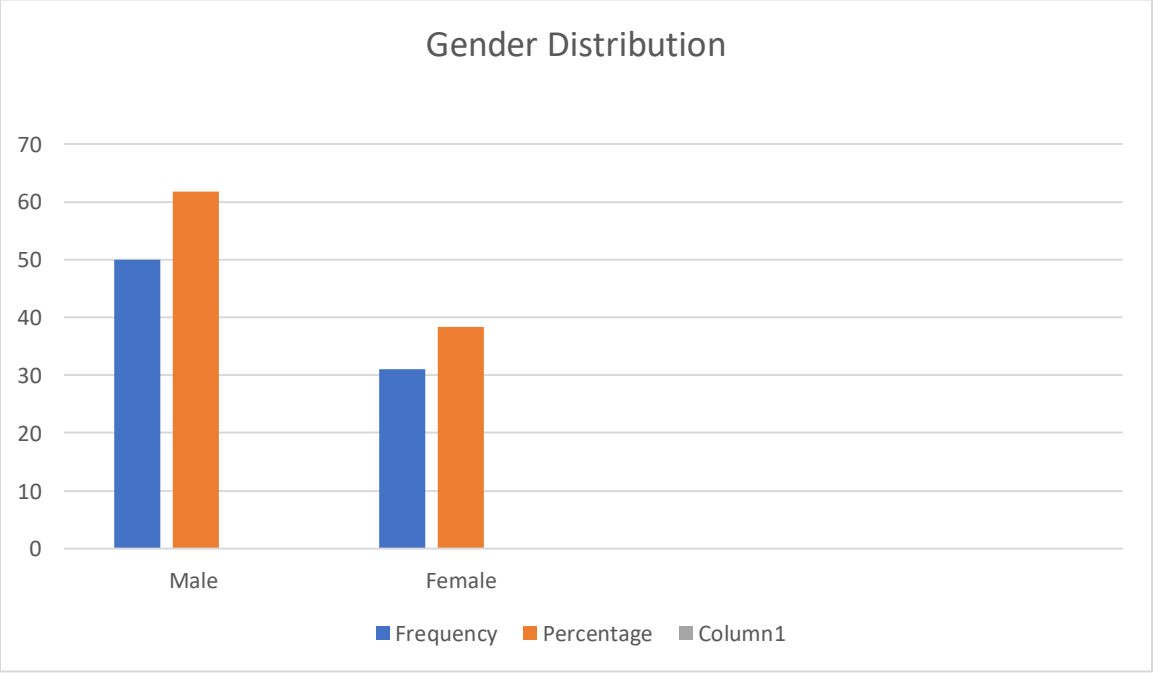
4.2 Demographic Characteristics of Respondents

In order to capture a comprehensive profile of the respondents, variables related to socio-economic characteristics of soyabean farmers in Guruve District were identified. Main factors to be considered included gender, age, marital status, educational background and size of the household, which significantly determine the level of yield of soyabeans amongst smallholder farmers.

4.2.1 Gender Distribution of Respondents

Table 4.2: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	50	61.7
Female	31	38.3
Total	81	100



Source: Field Survey Data (2026)

The data also indicate that Soyabean cultivation in the district is still a male dominated activity as 61.7% of respondents are males while females are 38.3%. Although males dominate, the percentage of females involved in cultivation is significant indicating the increasing acceptance of women's role in cash farming. These findings correspond with that of the Food and Agriculture Organization (2022) that acknowledges women as an integral part of agricultural workforce in most of Sub-Saharan African states, but they still face constraints in access to land, credit and other critical resources.

4.2.2 Age Distribution of Respondents

Table 4.3: Age Distribution of Respondents

Age Group	Frequency	Percentage (%)
18–30 years	14	17.3
31–40 years	21	25.9
41–50 years	25	30.9
51–60 years	15	18.5
Above 60 years	6	7.4
Total	81	100

Source: Field Survey Data (2026)

Majority of respondents were in economically active group of between 31-50 years, with the biggest majority in 41-50 years old farmers being 30.9% of the sample, showing thatsoyabean farming in Guruve district is predominatly done by middle-aged farmers that have both experience in farming as well as the physical strength for continued agricultural activities. Young farmers are few as rural-urban migration; access to land and difficulty in accessing start up capital could have affected participation in farming by young farmers. This observation corroborates the finding by

Mutenje and Mlambo (2023) that Zimbabwe's farming population is rapidly ageing and also noted with concern sustainability of smallholder farming if young people did not participate in farming.

4.2.3 Marital Status of Respondents

Table 4.4: Marital Status of Respondents

Marital Status	Frequency	Percentage (%)
Single	12	14.8
Married	56	69.1
Divorced	7	8.6
Widowed	6	7.4
Total	81	100

Source: Field Survey Data (2026)

A greater majority of respondents were married, representing 69.1 per cent of the total sample size. Married households are usually more advantageous in agricultural production because they can tap family labor for tedious and labor intensive activities like plowing and weeding and harvesting. Easy access to this family labor is especially important in small scale farming because hiring outside labor would erode on the margins.

4.2.4 Education Level of Respondents

Table 4.5: Level of Education

Education Level	Frequency	Percentage (%)
No formal education	5	6.2
Primary education	19	23.5
Secondary education	45	55.6
Tertiary education	12	14.8

Total	81	100

Source: Field Survey Data (2026)

Education status: Above fifty percent of farmers attained secondary school education (55.6 percent) which indicates a good sign for technology adoption and better farm performance. Education can help farmers to learn from the agronomic recommendations made by the extension agents, make better decisions about inputs selection and adoption of modern agricultural practices more effectively. Similarly Kassie et al. (2021) proved that education has played a major role in adoption of technologies and better agricultural production among sub- Saharan Africa farmers.

4.2.5 Household Size

Table 4.6: Household Size

Household Size	**Frequency**	**Percentage (%)**
1–3 members	14	17.3
4–6 members	39	48.1
7–9 members	22	27.2
Above 9 members	6	7.4
Total	81	100

Source: Field Survey Data (2026)

Of the homes investigated nearly half had between 4 and 6 members according to the statistics. In a farming environment it is beneficial for the home to be relatively small as this guarantees that enough family members are available when needed, especially during busy periods of planting and harvesting. In contrast, a bigger home would also put a heavier strain on domestic food resources and financial resources, which could prove limiting in the amount that can be reinvested in the business.

4.3 Farm Characteristics of Respondents

4.3.1 Farming Experience

Table 4.7: Years of Soyabean Farming Experience

Years of Experience	Frequency	Percentage (%)
Less than 2 years	11	13.6
2–5 years	32	39.5
6–10 years	26	32.1
More than 10 years	12	14.8
Total	81	100

Source: Field Survey Data (2026)

The majority of respondents had 2 to 10 years of experience in soyabean farming, which suggests that the respondents constitute a relatively experienced community of farmers. A farmer with a number of years of experience in growing soyabeans will likely be better prepared to overcome challenges in the production system, make wise decisions about inputs and be willing and able to adopt better agronomic practices that will have a significant impact on yield.

4.3.2 Land Under Soyabean Production

Table 4.8: Land Size Under Soyabean Production

Land Size	Frequency	Percentage (%)
Less than 1 hectare	23	28.4
1–2 hectares	37	45.7
3–5 hectares	16	19.8
Above 5 hectares	5	6.2
Total	81	100

Source: Field Survey Data (2026)

Most farmers grew about 1 to 2ha of soyabeans. This is in line with the fact that Guruve District is a smallholder dominated area. Small farm sizes limit chances of exploiting economies of scale, restrict choices of mechanisation and limit total production. These results conform to the results

by Mutenje et al. (2023), that it is typical for the average smallholder farmers in Zimbabwe to grow under 2ha of land.

4.3.3 Average Soyabean Yield per Hectare

Table 4.9: Average Soyabean Yield per Hectare

Yield Category	Frequency	Percentage (%)
Less than 1 tonne/ha	29	35.8
1–2 tonnes/ha	35	43.2
2–3 tonnes/ha	13	16.0
Above 3 tonnes/ha	4	4.9
Total	81	100

Source: Field Survey Data (2026)

Majority of the farmers had their yield between 1 to 2 t/ha and 35.8 % of the farmers had yields less than 1 t/ha. Only 4.9% of the farmers have yields greater than 3 t/ha. The above values suggests that the yield of soyabeans is still very low compared to the agronomic yield in Guruve District. Mabhaudhi et al. (2023) stated that, yield can increase to greater than 3 t/ha under good management practices and effective use of inputs. This shows that, the yield could improve significantly through proper agronomic practices and good access to inputs and extension services.

4.3.4 Purpose of Soyabean Production

Table 4.10: Purpose of Soyabean Production

Purpose	Frequency	Percentage (%)
Consumption only	9	11.1
Income generation	39	48.1
Livestock feed	7	8.6
Both consumption and income	26	32.1

Total	81	100

Source: Field Survey Data (2026)

The farmers are growingSoyabeans mainly for commercial purposes. Close to half of them (48.1 per cent) produce only for sale in the market, while another 32.1 per cent cultivate the crop both for domestic consumption and sale. This trend indicates the emerging awareness of Soyabeans as a major cash crop that can contribute to household income above the subsistance level.

4.4 Trend Analysis of Soyabean Production in Zimbabwe

To provide context for the field-level findings, the study analysed national soyabean production trends in Zimbabwe from 2016 to 2025.

Table 4.11: National Soyabean Production in Zimbabwe (2016–2025)

Year	**Production (Metric Tonnes)**
2016	58,000
2017	62,000
2018	71,000
2019	65,000
2020	47,000
2021	54,000
2022	61,000
2023	45,500
2024	43,907
2025	41,919

Source: Mutenje et al. (2023); Mutenje et al. (2024); ZIMSTAT (2025)

Overall, national soyabean production in Zimbabwe seems to have decreased over time, falling from a peak of approximately 71,000 metric tonnes in 2018 to 41,919 metric tonnes in 2025. These estimates still represent a deficit from the projected annual national demand, estimated to be 220,000 metric tonnes per year (Herald, 2025). As a result of these production shortfalls, Zimbabwe continues to be heavily reliant on imports of the crop to service the cooking oil and animal feed sectors. This decline in production is attributed to high input costs, climate change and a lack of access to agricultural credit and extension services. These results align with Mutenje and Mlambo (2023) and Mutenje et al. (2024), suggesting a worsening structural soyabean deficit at the national level.

4.5 Socio-Economic Factors Affecting Soyabean Production

4.5.1 Access to Improved Seed

Table 4.12: Access to Improved Seed

Response	Frequency	Percentage (%)
Yes	49	60.5
No	32	39.5
Total	81	100

Source: Field Survey Data (2026)

Roughly 60.5% of the farmers had access to improved certified seed varieties, while the remaining 39.5% did not, hence the need to rely on reused farm-saved seed. Seed saved has lower germination rates, is less disease resistant and has lower yields when compared to certified seed. These results agree with general trends of ZEPARU (2018), which concluded that slightly more than one-third of smallholder farmers in Mashonaland Central Province were using certified Soyabean seed in a typical season.

4.5.2 Fertilizer Use

Table 4.13: Fertilizer Use Among Respondents

Response	Frequency	Percentage (%)

Yes	54	66.7
No	27	33.3
Total	81	100

Source: Field Survey Data (2026)

Of those farmers who cultivated soyabeans, two thirds (66.7%) used some form of fertilizer. Focus group interviews, however, indicated that majority of fertilizer users used at below the recommended agronomic levels of fertilizers due to costs of the inputs. The overall result of under-use of fertilizers is sub-optimal production levels which result from nutrient deficiency in the soil and hence limited increase from better seeds.

4.5.3 Access to Agricultural Credit

Table 4.14: Access to Agricultural Credit

Response	**Frequency**	**Percentage (%)**
Yes	29	35.8
No	52	64.2
Total	81	100

Source: Field Survey Data (2026)

The results showed that 64.2% of the respondents had no form of agricultural credit facility. They can thus not afford the purchase of sub-optimal inputs or to cultivate a greater area which greatly hinders their capacity to purchase premium seeds, fertilizers and agrochemicals promptly. This confirms the study done by Mutenje and Mlambo (2023) where it established that there is low access to affordable agricultural credit which acts as the major impediment to smallholder agricultural productivity in Zimbabwe.

4.5.4 Production Challenges Faced by Farmers

Table 4.15: Major Production Challenges

Challenge	**Frequency**	**Percentage (%)**

High input costs	33	40.7
Climate variability	17	21.0
Poor seed quality	15	18.5
Labour shortages	9	11.1
Pests and diseases	7	8.6
Total	81	100

Source: Field Survey Data (2026)

Among all, higher production costs were regarded as a key constraint by majority (40.7 percent) of the soyabean growers in Guruve district. This is mainly due to increasing prices of certified seed, fertilizer, fuel, which significantly reduced farmers' net returns and thus restricting them from making adequate investments for crop production. Secondly, climate variability was reported by 21.0 percent of the farmers, due to increasingly unpredictable rainfall patterns and longer drought periods, the damage caused by these is no longer managed without irrigation. Other mentioned constraints include poor seed quality (18.5 percent) and labor shortage (11.1 percent).

4.6 Institutional Factors Affecting Soyabean Production

4.6.1 Access to Extension Services

Table 4.16: Access to Extension Services

Response	**Frequency**	**Percentage (%)**
Yes	46	56.8
No	35	43.2
Total	81	100

Source: Field Survey Data (2026)

Slightly more than half of farmers surveyed (56.8%) had received some extension service while 43.2% of farmers had no effective access to extension services. Access to extension was directly related to distance from the Agritex offices, with farmers more than ten kilometres from offices

being less visited than farmers nearer the office. With the observed positive influence of extension contact on technology use and increased productivity (Davis et al., 2022), this deficit in extension services becomes a major institutional impediment to soyabean production in the district.

4.6.2 Distance to Nearest Market

Table 4.17: Distance to Nearest Market

Distance	Frequency	Percentage (%)
Less than 5 km	14	17.3
5–10 km	22	27.2
10–20 km	31	38.3
Above 20 km	14	17.3
Total	81	100

Source: Field Survey Data (2026)

Of the farmers, 38.3 per cent lived between 10 and 20 km away from the nearest market, while 17.3 per cent lived more than 20 km away from the market. High distance to market leads to high cost of transport, greater post-harvest losses, and smaller farm-gate prices thus lower profit from soyabean production. The results agree with Davis et al. (2022), where high market distance price penalty was reported for the small holder farmers in Sub-Saharan Africa.

4.6.3 Farmer Perceptions on Government Policies

Table 4.18: Farmer Perceptions on Government Policies

Response	Frequency	Percentage (%)
Policies affect production	57	70.4
Policies do not affect production	24	29.6
Total	81	100

Source: Field Survey Data (2026)

The farmers largely believed that government policies had a major role in guiding their soy production decision (70.4 percent of the respondents. The farmers expressed concerns about lack of local market buyer competition, volatile and uncertain producer pricing systems and late receipt of subsidized inputs. Such institutional weaknesses create an unfavorable climate for farmers to plan and invest reliably and provide negative production incentives. Strengthening the policy environment, mainly producer price stabilization, punctual delivery of inputs and healthy local markets, was identified by several stakeholders as being vital for higher soyabean production.

4.7 Regression Analysis

The combined impact of institutional and socioeconomic determinants on soyabean yield in Guruve District was investigated using multiple linear regression analysis. The calculated model looked like this:

Where Y = soyabean yield (tonnes/ha); X_1 = education level; X_2 = farm size; X_3 = access to credit; X_4 = access to improved seed; X_5 = extension services; X_6 = farming experience; and ε = error term.

Figure 4.1: Regression Model – Coefficients Summary

Variable	Coefficient (β)	Std Error	t-value	p-value
Constant	0.841	0.291	2.89	0.005
Education level (X_1)	0.214	0.073	2.93	0.004
Farm size (X_2)	0.376	0.081	4.64	0.000
Access to credit (X_3)	0.287	0.094	3.05	0.003
Improved seed access (X_4)	0.318	0.089	3.57	0.001
Extension services (X_5)	0.192	0.078	2.46	0.016
Farming experience (X_6)	0.164	0.067	2.45	0.017

$R^2 = 0.71$ | Adjusted $R^2 = 0.68$ | F-statistic = 18.74 | Prob > F = 0.000

Source: Field Survey Data (2026)

All six variables have a statistically significant beneficial impact on soyabean output, according to the regression results. Farm size demonstrated the highest correlation ($\beta = 0.376$, $p < 0.001$), suggesting that farmers with bigger cultivated areas often get much higher yields, probably as a result of more effective input allocation and a greater ability to invest in labour and mechanization. The second strongest predictor ($\beta = 0.318$, $p = 0.001$) was access to improved seed, indicating that using certified varieties instead of stored seed is a crucial factor in production. Credit availability ($\beta = 0.287$, $p = 0.003$) also had a substantial favourable impact since it allows farmers to quickly buy the recommended amounts of high-quality inputs. Additional factors that favourably impacted production outcomes were education level ($\beta = 0.214$, $p = 0.004$), extension services ($\beta = 0.192$, $p = 0.016$) and agricultural experience ($\beta = 0.164$, $p = 0.017$). The model's significant explanatory ability was demonstrated by the fact that it explained around 71% of the variation in soyabean production overall (R2 = 0.71).

4.8 Diagnostic Tests

4.8.1 Multicollinearity Test

Variance Inflation Factor (VIF) analysis was conducted to assess whether multicollinearity posed a problem in the regression model. Multicollinearity occurs when two or more explanatory variables are strongly correlated, which can distort coefficient estimates and widen standard errors (Hair et al., 2019).

Table 4.22: Variance Inflation Factor (VIF) Results

Variable	**VIF**
Education level	1.82
Farm size	2.14
Access to credit	1.76
Improved seed access	2.08

Extension services	1.69
Farming experience	1.91
Mean VIF	1.90

Source: Field Survey Data (2026)

All VIF values were well below the commonly accepted threshold of 5 (Hair et al., 2019; Field, 2018), with a mean VIF of 1.90. This indicates that multicollinearity was not a significant concern in the regression model and that the estimated coefficients can be interpreted with confidence.

4.9 Hypothesis Testing

Hypothesis 1 (H1): Smallholder access to higher-quality seed and chemical inputs is positively associated with soyabean production levels.

The regression results provided strong support for this hypothesis. Access to improved seed was statistically significant ($\beta = 0.318$, $p = 0.001$), indicating that farmers using certified varieties achieved substantially higher yields than those relying on saved seed. H1 is therefore accepted.

Hypothesis 2 (H2): Farmers' inclination to increase soyabean production is not significantly impacted by stringent grain marketing laws and little buyer competition.

This idea is refuted by the study's evidence. Farmers' motivation and ability to increase production are greatly impacted by market conditions, such as unpredictable producer pricing and little buyer competition, according to survey responses and focus group talks. As a result, the alternative hypothesis that market-related institutional elements do affect production decisions is accepted and H2 is rejected.

Hypothesis 3 (H3): Participation in extension training programmes does not significantly affect the adoption of improved agronomic practices for soyabean.

This hypothesis is rejected. The regression results show that extension services exert a statistically significant positive effect on soyabean yields ($\beta = 0.192$, $p = 0.016$), confirming that advisory support from Agritex officers meaningfully improves production outcomes. Farmers with regular access to extension services were observed to adopt better agronomic practices, demonstrating the practical value of institutional advisory services.

4.10 Strategies and Policy Options for Improving Soyabean Production

Respondents were asked to identify the interventions they considered most important for improving soyabean production in Guruve District. Their responses are Summarizedbelow.

Table 4.24: Farmer-Suggested Interventions for Improving Production

Strategy	Frequency	Percentage (%)
Improved access to agricultural credit	23	28.4
Improved seed availability	19	23.5
Better extension service delivery	15	18.5
More stable producer prices	12	14.8
Irrigation infrastructure development	7	8.6
Farmer training and capacity building	5	6.2
Total	81	100

Source: Field Survey Data (2026)

Access to affordable agricultural credit was identified as the single most important intervention (28.4 per cent), followed by better access to certified seed (23.5 per cent) and improved extension services (18.5 per cent). These preferences closely mirror the quantitative regression findings, which identified farm size, improved seed access and credit as the three strongest positive determinants of yield. Together, they point toward a coherent policy agenda centred on input financing, seed system strengthening and advisory service expansion.

4.10.1 Willingness to Expand Soyabean Production

Table 4.25: Willingness to Expand Soyabean Production

Response	Frequency	Percentage (%)
Yes, willing to expand	64	79.0
No, not willing to expand	17	21.0

Total	81	100

Source: Field Survey Data (2026)

The farmers would have wanted to expand production significantly (79.0% expressed interest in increasing the size of the Soyabean crop). This underlying interest could be an asset to policy makers in addressing Guruve District's genuine need for increased productivity development, assuming the obstacles listed above, especially, credit access, availability of seed, and market situation, were addressed.

4.11 Discussion of Findings

The findings from the study confirm that there is indeed a significant relationship between institutional and socio-economic variables and Soyabean production in Guruve District. This corroborates the body of literature that have revealed the farm size, access to improved seed and credit as three most significant variables contributing to increased Soyabean yields in both Southern Africa and the rest of the world (Mutenje et al., 2023; Mabhaudhi et al., 2023).

The levels of yields being reported-between 1 and 2 t/ha in most cases-still fall short of both national demand levels and theoretical yields of over 3 t/ha under appropriate management and are partly due to limited input availability, lack of institutional support and deterioration in climate. It is alarming that up to 64.2% of farmers did not have access to credit due to lack of ability to readily acquire needed quality inputs in a timely fashion for a profitable enterprise.

The identified institutional constraints conform to the identified structural constraints that characterize the literature including dominated of small farms (under 2ha), low mechanization and unnecessary repeated fertilizer application. Extension services despite having reached a little over half of the respondents show statistically significant positive relationship with yields, so, the scope and quality of these advisory services can have huge payoff if expanded.

Institutional constraints that repeatedly feature include distances to market, prices volatility and slow delivery of inputs that hinder both current production and future development. The fact that a significant number of farmers (79.0%) were willing to increase production if only the support environment is improved, shows the potential of a mobilisable farming community if the support environment is enhanced.

4.12 Chapter Summary

This chapter presented and discussed the results of the study on the socio-economic and institutional determinants of soyabean production in Guruve District. A sample of 81 respondents was selected from the population of 102 registered soyabean farmers using the Yamane (1967) formula, of which 81 questionnaires were retrieved from the 95 that were distributed. This corresponds to an 85.3 per cent response rate.

The farmers were predominantly middle-aged, married, male and secondary school leavers, with moderately-sized households-an attribute that can generally support high-level farming. At the farm level most farmers managed 1-2ha producing yields of 1-2 t/ha which are far below the crop's potential.

The results from regression analysis indicated that farm size, use of improved seeds, access to credit, farmers' education level, extension services and years of experience had significant positive impacts on the Soyabean yield. Overall, these factors explained about 71 per cent (R=0.71) of the variation in yields. Diagnostic tests proved the model to be acceptable with no VIF problem showing the absence of significant multicollinearity.

Constraints at the institutional level were few, long distances to markets, limited extension coverage and policy related factors. However there was general agreement among respondents that improved access to credit, better seeds and improved extension services are the priority interventions. These results formed a solid evidentiary base for the conclusions and recommendations presented in Chapter 5.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This last chapter summarizes the study's findings, draws conclusions from the study's evidence, and recommends actions for enhancing soyabean production among smallholder farmers in Guruve District of Mashonaland Central Province, Zimbabwe. The chapter is structured according to the four research objectives followed in this study and also includes policy implications, recommendations for future study, and the concluding statement. The evidence in this study has been collected from 81 smallholder farmers growing soyabean, where the sample was drawn from

a population of 102 registered farmers using the formula Yamane (1967), yielding an 85.3% response rate.

5.1 Summary of Findings

The study investigated the institutional and socioeconomic factors influencing the production of soyabean in Guruve District. Specifically, it analyzed national production trends; identified key determinants of production; and examined institutional constraints and proposed remedial measures to mitigate them. Data was collected from 81 smallholder farmers via structured questionnaires, personal interviews and focus group discussions. It was analyzed using descriptive statistics and multiple linear regression.

Majority of the farmers were married men of middle age (61.7% were male and 69.1% married) and most of them completed secondary education (55.6%). Most of the farmers had 1-2 hectares under soyabean (45.7%) and most of them had between 1-2 tonnes/hectare (43.2%) yield. However, a number of them 35.8% harvested less than 1 tonne per hectare. This yield is far below the yield potential of over 3 tonnes per hectare for the district.

National production data showed a generally declining trend of soyabean from 2016 to 2025. Production went down to 41, 919 metric tonnes by 2025 from about 57 000 metric tonnes a year at peak production. A projected national demand for soyabeans is about 220 000 metric tonnes by 2025 which indicates a widening gap and continues reliance on imports.

The socioeconomic variables showed that 60.5% had access to improved certified seed and 39.5% used saved seeds on their own farms. 66.7% farmers had access to fertilizer; however most of them used amounts below recommended level due to their costliness. Only 35.8% of the farmers had access to credit. The most identified constraints were the cost of input (40.7%), climate variability (21.0%) and seed quality (18.5%).

The institutionality of soyabean production revealed that 56.8% had access to extension services and this was closely linked with the distance to nearest Agritex office. The furthest they were from the nearest market was between 10 and 20 km (38.3%) and they thought that the government policies had a great influence on their production (70.4%). The effects include price instability, delayed delivery of input and low number of buyers.

All the six variables tested had positive significant effect on soyabean yields with education, farm size, credit availability, access to improved seed, extension service and farming experience explaining 71% variation in soyabean yield. The R-squared value for all the explanatory variables was 0.71. Multicollinearity test had mean VIF value 1.90 well below the threshold 5, so, multicollinearity is not a problem in this model.

Hypothesis tests showed that availability of improved inputs and seed affects the production positively (H1 accepted). The market conditions and prices fluctuations affected the decision to expand production negatively (H2 rejected) while the adoption of improved techniques was improved through extension services (H3 rejected).

Farmers were recommending better access to credit (28.4%), more improved seeds (23.5%) and better delivery extension services (18.5%). Overall, 79% were willing to increase production if the major problems were addressed, which means there is a potential to increase soyabean production in Guruve District.

5.2 Conclusions

It can be concluded that both socioeconomic circumstances and institutional provision are important intertwined determinants of Soyabean production performance of smallholder farmers in Guruve District. The following specific conclusions can be reached from the evidence:

First, soyabean production in Zimbabwe has shown a declining trend over the past decade or so. It is estimated to fall from peak levels of 130,000+ tonnes to some 41,919 tonnes in 2025. The growing deficit, compared to estimated annual national requirement of 220,000 tonnes per annum, is likely the compounded result of the chronic structural constraints not sufficiently overcome by current public and private sector initiatives.

Second, socioeconomic characteristics have a strong bearing on productivity. Specifically farm size, level of education and farmer experience have significant explanatory power on yield of Soyabeans. Farm size stood out as by far the strongest explanatory variable confirming that limited size constraints is indeed a fundamental limitation to production. The clear educational gradient exhibited in the data is also in line with the general hypothesis of the importance of investment in farmer education and knowledge for improved productivity.

Third, both access to improved seeds and credit are significant productivity enhancers which continue to remain elusive for a good majority of farmers. The fact that almost 40 per cent of the farmers did not have access to certified seed and nearly two-thirds of farmers had no access to credit directly explains the problem with input quality and timeliness of application of fertilizers and agro-chemicals.

Fourth, institutional support such as extension services and access to markets have a positive influence on production performance. The fact that farmers who have received extension contact are statistically more productive shows that extension is an efficient technology delivery channel when accessed by farmers. It has a limited reach as 43.2 percent of farmers are not able to access extension services and more than half (almost) are located in more than 10kms from the markets.

Fifth, there is a direct relationship between marketing and policy-related institutional shortcomings and a farmers' willingness and ability to make investments on enhancing production and yields. High latent demand for Soyabeans (79.0% willing to increase production) demonstrates that farmers have capacity and willingness to boost their Soyabean production, but are hindered by institutional challenges.

Overall it can be concluded that unless structural constraints associated with lack of access to credit, inefficient input supply systems, inefficient extension services and dysfunctional marketing systems are redressed by systematic government and private sector policy action Soyabean production in Zimbabwe will continue to remain well below the country's potential with the attendant continued import dependency.

5.3 Recommendations

Based on the study's findings and conclusions, the following recommendations are directed at the relevant stakeholders.

5.3.1 Recommendations to Government

Government of Zimbabwe's recommended interventions in the enhancement of soyabean production in Guruve district and Zimbabwe are:

Broaden accessible agricultural credit lines. Government needs to introduce a smallholder agriculture credit facility where low interest rate credit would be available and not strictly tied to the availability of high-value collateral. Through linking micro-finance institutions, farmer-based

Organizations and cooperatives, the reach of credit facilities would extend to the 64.2% of farmers without access to credit lines thereby allowing access to inputs.

Improve timely provision of certified seeds and suitable fertilizer inputs under the Presidential Inputs Support Scheme. Since delayed inputs was reported as a constraint, which negated the benefit derived from the subsidy program by the majority of respondents, it becomes paramount that inputs must reach farmers on time or at best slightly before the commencement of the planting season.

Significantly increase investment in agricultural extension services. More Agritex officers need to be appointed in high potential districts such as Guruve. The mobility of Agritex officers must be supported with vehicle, fuel, etc and there should be a pilot of digital extension techniques such as mobile-based extension approaches to enhance access to extension services among the rural populace who reside far from centers.

Initiate and implement a holistic irrigation master plan for smallholder farmers. A smallholder, based on focus, irrigation facility of furrow and drip should be made available especially in regions II and III. Since climate variability was the second major identified constraint (21.0%), dependence on rain-fed cultivation should be reduced.

Introduce and support an accessible, clear and transparent production price mechanism for soyabeans. A clearly announced producer price mechanism in advance would remove the price uncertainties in producers' decision to invest. A producer floor price set in coordination with commodity traders should be maintained and well-communicated to producers in advance to stimulate growth of cultivated area and improve input quality.

5.3.2 Recommendations to Financial Institutions

In light of the above, banks, micro-finance institutions and development finance institutions engaged in agricultural finance in Zimbabwe must take the following steps.

Provide user-friendly agricultural loan products where loan collaterals should be realistic with respect to smallholder farming conditions including: the use of predicted yields; land permits; group collateral as legitimate loan securities.

Package agricultural loans products jointly with contract farming partners; farmer groups and Agritex offices where loan funds are to be used for the purchase of inputs, advisory support and secure markets for the final produce; reducing the chances of loan defaults and enhancing productivity.

Enhance market penetration in Guruve district, to this end satellite banks and the use of mobile money services should be set up at small towns and trading centers for ease of access and time savings as compared to their current formal finance seeking process.

5.3.3 Recommendations to Private Sector and Agribusiness Firms

Actions for Agro-processing firms, input suppliers, agro-dealers and contract farming operators include;

Consolidate and strengthen contract farming schemes which integrate provision of certified seeds, inoculants, fertilizer, extension and guaranteed markets with price premiums. These multi-dimensional approaches can ease various constraints simultaneously (inputs, credit, technical knowledge and markets), are ideal for resource-constrained smallholder farmers.

Offer farmers attractive, reliable and transparent farm-gate prices, as unstable price is indicated by 70.4% farmers as a constraint, therefore providing attractive prices and prompt payments would reduce this obstacle.

Invest in rural input supply chains through creation and support of an agro-dealer network in under-serviced wards of Guruve District, thereby shortening the distances traveled by farmers for purchasing certified seed and other inputs, as 38.3% of farmers were traveling over 10km.

Consider investment in local soyabean processing capacity e.g. Small-scale oil extraction and animal feed manufacturing facilities, thus creating further local demand and improving farm gate price, and reducing post-harvest marketing constraints for smallholders.

5.3.4 Recommendations to Farmers

It is recommended that smallholder soyabean farmers in Guruve District:

Ensure use of certified seeds over self-saved seed; the regression model showed that access to improved seeds was the second best predictor of yield (= 0.318, p = 0.001) and the improved productivity gains from using certified over recycled seed have long been established in literature. For farmers who cannot afford certified seeds individually, pooling the demand with farmer groups or cooperatives may reduce per-unit costs.

Utilise fertilizer and other inputs at recommended levels; focus group discussions revealed that many who apply fertilizer apply below the recommended amount, severely restricting yield potential of improved seeds. Facilitating access to credit or contract farming finance to purchase full input packages could address this.

Actively utilise existing extension services and farmer training programmes; extension contact was the third best predictor of yield (= 0.192, p = 0.016) hence farmers should avail themselves of visits from Agritex officers, group training, demonstrations plots, and farmer field schools where possible.

Organise themselves into groups or cooperatives to facilitate collective action, group marketing and bulk input purchase. Grouping reduces transaction costs and increases individual farmers' bargaining power. It also facilitates access to finance otherwise unobtainable.

Enter into contract farming arrangements with suitable terms and conditions where available. Contract schemes with input supply, technical advice and market assuredness can be a package solution to many constraints faced by smallholder soyabean farmers.

5.3.5 Policy Recommendations

Overall, at the policy level, the following strategies are suggested:

Set up an agricultural development financing window (by the Reserve Bank of Zimbabwe or designated DFI) which offers concessionary loans for smallholder producers of selected crops, such as soyabeans, with the purpose of alleviating the structural credit market failure that leaves 64.2 percent of farmers without credit for their production.

Develop a national certified seed multiplication and distribution plan that would ensure the availability of sufficient certified seeds of high-yielding and disease-resistant soyabean varieties

at the ward level at a subsidized price before each planting season. The shortage of certified seeds, which about 40 percent of the farmers lack, represents a fundamental constraint to all the other suggested measures.

Incorporate soyabeans in the national food and nutrition security strategies at an equal priority level to maize (with specific budgets for extension, research, infrastructure development etc). Soyabean should feature high up on the country's priorities due to its role in supplying the cooking oil and animal feed sectors, and its current 70% reliance on imports to meet these needs.

Investigate the application of digital tools in soyabean value chains, such as the use of blockchain-based commodity tracking systems, mobile advisory applications and e-commerce platforms for the improvement of market transparency, information asymmetry and enhanced smallholder producers' bargaining power.

Develop and implement a Guruve district soyabean development plan which would be a coherent multi-year programme with clearly defined goals, measurable targets and accountability mechanisms, and would incorporate credit access, seed delivery, extension services delivery, irrigation development and market linkages in an integrated approach.

5.4 Areas for Further Research

This study has provided valuable insights into the socioeconomic and institutional determinants of soyabean production in Guruve District. However, several related areas merit further investigation.

The impact of climate change and climate variability on soyabean productivity in Zimbabwe's different natural regions, along with the development of locally adapted climate-smart agricultural practices for smallholder producers.

A comprehensive value chain analysis of soyabean marketing, processing and export in Zimbabwe, examining price formation, margin distribution among chain actors and the barriers to entry for smallholder producers.

A comparative study of the effectiveness of different contract farming models, including nucleus-outgrower schemes, tripartite arrangements involving financial institutions and cooperative-based structures, in improving smallholder soyabean incomes and production outcomes.

An investigation of the gender dimensions of soyabean production in Guruve District and other smallholder farming areas of Zimbabwe, examining the specific constraints faced by female farmers and the differential impact of institutional support on male-headed and female-headed households.

Research on the potential of irrigation development, including small-scale drip irrigation, dam construction and groundwater extraction, to reduce climate-related production risk and enable year-round soyabean production in suitable areas of Zimbabwe.

A comparative analysis of soyabean production systems across communal, A1 resettlement and A2 commercial farming areas in Zimbabwe, to identify the institutional arrangements and resource configurations most conducive to productivity improvement at each scale.

The adoption potential and productivity impact of emerging agricultural technologies, including drone-based crop monitoring, digital soil testing and mobile-based extension advisory systems, in the context of smallholder soyabean farming in Zimbabwe.

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Appendix 1: Questionnaire

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

DEPARTMENT OF AGRICULTURE ECONOMICS EXTENSION AND EDUCATION



Questionnaire for Smallholder Soya bean Farmers

Dear Sir/Madam

Subject: Survey Questionnaire for investigating the socio-economic and institutional factors affecting soya bean production by smallholder farmers in Guruve District.

I am undertaking an undergraduate research project on the socio-economic and institutional factors affecting soya bean production by smallholder farmers. Knowledge on the socioeconomic and institutional factors affecting soyabean production will have a paramount important to the government, scholars, farmers and others. More over the result of this study will be used as additional reference for those who want to conduct detailed research on the area. To this end, I have prepared a self administered questionnaire to help me gather the relevant information from the selected soya bean farmers. The quality of the result of this research is based on the accuracy of the information you provided. Eventually, I promise you, the information you will provide me is going to be reported and communicated in aggregate and utmost care will be taken for its confidentiality.

Household Characteristics

1. Are you the head of the household (tick the appropriate)? Yes ☐ No ☐

2. What sex is the head of the household? Male female

3. What age is the head of the household?

4. What is the highest level of education of the head of the household? (*indicate by ticking*)

i. none	ii. informal	iii. Primary	iv. Secondary	v. Tertiary

5. Household size?

6. Indicate other income-generating activities (*indicate by a tick*) Livestock ☐ Off farm ☐

Cultivation ☐

7. How do you fund soya bean production activities?

Personal saving s ☐ Bank loans ☐ Borrowing from friends ☐ Farmers Association ☐

8. What is the costs of production per hectare?

9. For the household members who reside here please indicate their numbers as required in the following table the following table

Age group/gender	Number of individuals	Age group/gender	Number of individuals
Males over 60 years old		Males 31-49 years old	
Females over 60 years old		Females 31-49 years old	
Males 50-60 y ears old		Males 18-30years old	
Female 50-60 years old		Females 18-30years old	

Assets-Land

10. When did you start growing soya beans?

11. Total area under soya bean production in the last cropping season (Ha or acres)……

Institutional Factors

12. Do you have access to credit facilities? Yes NO

13. If you did not obtain credit, what were the reasons? (*Tick where applicable*)

credit did no t seek

unfavourable terms

repayment no

collateral

) unavailability of high interest rate

Did not need

Others (specify)

14. Do you have access to extension services? Yes No

15. How often do you interact with extension officers?

Constraints and Solutions

16. What is the distance to the market in kilometers (km)?

17. What other constraints do you face in production of soya beans?

18. What are the possible solutions to increase soya bean production?

19. Thank you that is all. Is there anything that you would like to add? If yes add below

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