ISSN: 2958-2326

AJoCsOpen
Sharing Knowledge in Business

African Journal of Commercial Studies

Publisher's Home Page: https://ijcsacademia.com/

AFRICAN JOURNAL OF COMMERCIAL STUDIES

Research Paper | Peer Reviewed | Open Access

Assessing the Constraints of Value Addition to Agricultural Products of Small and Medium Scale Farmers in Chongwe District, Zambia

Tisile Mwale[1]*, Austin Mwange[2]

[1] *Graduate School of Business, University of Zambia, Lusaka, Zambia*
[2] *Senior Lecturer, The University of Zambia, Graduate School of Business, Lusaka, Zambia*
* Corresponding Author

African Journal of Commercial Studies, 2025, 6(2), 127–147
DOI Link: https://doi.org/10.59413/ajocs/v6.i2.12

Article Info

Volume 6, Issue 2

Publication history:
Accepted on 10 April 2025;
Published: 12 April 2025

Article DOI:
10.59413/ajocs/v6.i2.12

Abstract

This study aimed to assess the constraints of value addition to agricultural products among small and medium-scale farmers in Chongwe District, Zambia. The research objectives included: identifying the constraints that hinder value addition, determining the extent to which these constraints affect the farmers, and proposing interventions to promote value addition in the district. A mixed-methods approach was employed, utilizing a case study design to collect data from 272 small and medium-scale farmers from Chongwe district. The data collection process involved structured questionnaires and semi-structured interviews, followed by thematic and statistical analysis. The findings revealed key constraints such as limited access to technology, inadequate financing, high production costs, lack of infrastructure, and regulatory barriers, which significantly impede farmers' ability to enhance product quality and increase market competitiveness. The regression analysis confirmed the relationship between these constraints and the adoption of value addition practices. The study recommends improving access to technology and financing, fostering capacity-building programs, and enhancing infrastructure development to promote value addition in the district. Furthermore, policy reforms to streamline regulatory processes are necessary to create a more enabling environment for smallholder farmers. The study's findings contribute to understanding the challenges and potential interventions for boosting agricultural productivity through value addition. It underscores the importance of a multi-faceted approach involving technology, financing, infrastructure, and policy support to empower farmers and stimulate agricultural growth in Chongwe District.

Keywords: Value addition, agricultural products, small and medium scale farmers, constraints, interventions, technology access, infrastructure

1. Introduction

1.1. Background

Value addition to agricultural products has been a fundamental practice since ancient times, initially serving the primary purpose of preserving food for lean periods (Clark et al., 2021). Over the centuries, the concept has evolved, with its modern definition focusing on the process of increasing the economic value and consumer appeal of agricultural commodities. This transformation can be traced back to the early 1800s when cooperatives in Wisconsin, United States, began to collaborate in efforts to improve production and distribution efficiency (Lakshmi & Aparna, 2022).

Globally, the importance of value addition in agriculture has grown, particularly in efforts to reduce agricultural poverty in rural areas. As noted by Chisanga et al. (2024), over the past few decades, the world has focused on reducing agricultural poverty through two key strategies: trade liberalization and technological advancements. Agricultural techniques, especially in the form of technology transfer and improved storage structures, have played a significant role in reducing postharvest losses, improving production, and increasing farm incomes as a way to achieve food security and sustainability.

The FAO (2020) reports that postharvest losses in developing countries can account for up to 40% of agricultural produce, underscoring the critical role that value addition practices can play in combating this issue.

In Southern Africa, strong linkages between agriculture and agro-processing are crucial to the economic development of many countries, including Zambia. Musonda (2020) highlights, the growth of the agro-processing industry in Zambia is pivotal for stimulating agricultural growth by creating new markets and increasing farmers' incomes. This, in turn, supports investment in land and farming inputs, which are necessary for improving productivity. According to the Food and Agriculture Organization (FAO, 2015), the growth of agro-processing value chains also positively impacts other sectors of the economy, such as packaging, logistics, and retail, presenting significant employment opportunities. Zambia's Ministry of Agriculture (2022) underscores that value addition is a worthwhile investment, offering higher returns, market penetration, and the potential for brand loyalty. Yet, as Etwire et al. (2013) argue, small and medium-scale farmers' ability to engage in value addition is often hindered by factors such as limited intellectual capacity, lack of education, and external economic pressures. The government and international donor agencies have increasingly focused on shifting farmers from subsistence to semi-commercial or commercial agriculture, which includes promoting value addition practices. Thindisa (2014) notes that cognitive factors, including education and prior market experience, play a critical role in farmers' capacity to embrace value addition

1.2 Statement of the Problem

Value addition involves transforming raw agricultural commodities into processed or value-added products, thereby increasing their market value, improving shelf life, and catering to diverse consumer preferences (Roy et al., 2013). The government of Zambia, with the aim of increasing agricultural production and productivity in the agricultural sector, supports and promotes value addition and manufacturing by creating an enabling environment for small and medium-scale farmers and the private sector (Ministry of Finance and National Planning, 2022).

Despite significant opportunities to increase income, improve product quality, and expand market access, less than 10% of agricultural products in Zambia undergo any form of value addition (Ministry of Agriculture Zambia, 2022). The majority of produce is sold in raw form, which results in missed market opportunities and lower profitability for farmers. This failure to add value to agricultural products limits farmers' ability to access both domestic and international markets, ultimately hindering their economic growth and the overall development of the agricultural sector in Zambia.

Smallholder farmers in Zambia face several constraints, such as limited access to technology, inadequate infrastructure, financial barriers, and complex regulatory frameworks that limit their ability to engage in value addition. Further Institutional support is often insufficient, and many lack the cognitive skills and knowledge needed to adopt new processing techniques and access profitable markets (Etwire et al., 2013; Thindisa, 2014). As a result, farmers continue to produce low-value, unprocessed commodities that are unable to meet the growing demands of both local and global markets, thereby reinforcing the cycle of poverty. Without the ability to add value to their products, small and medium-scale farmers in Zambia are unable to escape the limitations of subsistence farming. This not only hampers their economic potential but also affects the broader agricultural sector by limiting growth opportunities for agro-processing industries, which are crucial for stimulating agricultural productivity and rural development (FAO, 2015). Furthermore, the lack of value addition exacerbates the challenges posed by climate change, as farmers remain dependent on unprocessed agricultural products that are vulnerable to market fluctuations and postharvest losses.

1.3 Objectives of the Study

General Objective

To assess the constraints faced by small and medium-scale farmers in adding value to their agricultural products in Chongwe District, Zambia.

Specific Objective(s)

1. To establish the constraints of value addition to agricultural products in Chongwe District among small and medium-scale farmers.
2. To evaluate the effect of value addition constraints on small and medium-scale farmers' adoption of value addition practices in Chongwe District.
3. To establish interventions that can promote value addition to agricultural products in Chongwe District among small-scale farmers.

2. Literature Review

2.1. Concept and Importance of Value Addition in Agriculture

Value addition in agriculture refers to the process of transforming raw agricultural products into more valuable and marketable goods through various processes such as processing, packaging, branding, and improving the quality of the product (United States Department of Agriculture, 2010). This process not only enhances the economic value of the

products but also increases their appeal in both domestic and international markets. According to the United Nations Industrial Development Organization (UNIDO, 2020), value addition plays a crucial role in improving food security and fostering rural economic development, particularly in developing countries, by diversifying agricultural outputs and making them more competitive in global markets.

Value addition is vital for enhancing agricultural productivity. By introducing value-added activities such as processing and packaging, farmers can increase the shelf life of products and reduce postharvest losses. A study by Erenstein et al. (2021) highlighted that postharvest losses in sub-Saharan Africa can account for as much as 40% of agricultural production, particularly for perishable products like fruits and vegetables. Value addition, through improved storage and processing techniques, helps mitigate these losses, thereby increasing overall productivity and efficiency in the agricultural sector. Furthermore, adding value to raw materials enables farmers to produce more refined products that are in higher demand, which can directly lead to increased profitability (Bisht et al., 2020).

Value addition also plays a crucial role in rural development and food security. By creating value-added products, farmers in rural areas can tap into broader markets, which can boost local economies, create employment opportunities, and enhance income stability. According to the Food and Agriculture Organization (FAO, 2021), the development of agro-processing industries, such as milling, packaging, and preservation, helps diversify rural economies, moving them away from sole dependence on raw agricultural production. This transformation leads to improved food security by ensuring a steady supply of processed goods, which are easier to store and distribute. Additionally, the creation of jobs in the value addition sector reduces poverty and fosters long-term sustainable development in rural communities.

The importance of value addition in creating sustainable agricultural systems cannot be overstated. As climate change continues to impact agricultural production, particularly in developing countries, value addition helps ensure that agricultural systems remain resilient. By diversifying the types of products produced and expanding market access, farmers become less reliant on a single crop or agricultural output. This diversification not only makes agricultural systems more sustainable but also provides farmers with the flexibility to adapt to changing environmental conditions (UNIDO, 2020). Moreover, by fostering innovation in agricultural practices, such as organic certification or the use of climate-resilient varieties, value addition contributes to sustainable agricultural practices that prioritize environmental stewardship.

Overall, value addition is a key driver of agricultural development, productivity, and rural economic growth. It enhances product quality, increases farmers' incomes, and fosters sustainable agricultural systems. As global food security challenges continue to rise, the importance of value addition in agriculture becomes even more critical, offering a pathway for farmers to not only improve their economic well-being but also contribute to broader social and environmental sustainability.

2.2. Technological Constraints in Value Addition

Technological constraints are among the most significant barriers preventing small and medium-scale farmers from engaging in value addition activities. The ability to add value to agricultural products depends heavily on the availability and adoption of modern processing technologies, specialized equipment, and technical expertise. However, many smallholder farmers, particularly in developing countries, face significant challenges in accessing the necessary technologies that could enable them to improve the quality and marketability of their products.

One of the primary technological barriers is the lack of access to modern processing technologies. According to a study by Mwesigwa et al. (2021), small-scale farmers in sub-Saharan Africa, including Zambia, often rely on traditional, labor-intensive methods of processing and preservation, which significantly reduce the value of their products. These methods are not only inefficient but also yield lower-quality products that are less competitive in the global market. The lack of modern technologies such as solar dryers, milling machines, and automated packaging equipment limits farmers' ability to produce high-quality processed goods and decreases their profitability. Furthermore, the high costs associated with acquiring such technologies prevent smallholders from upgrading their systems, leaving them stuck in low-value, unprocessed production.

Another critical constraint is the insufficient availability of specialized equipment. Farmers in rural areas often face difficulties in accessing the necessary equipment to scale up value addition. As noted by Makori et al. (2020), even when technology is available, its adoption is often impeded by high initial costs, lack of repair services, and insufficient training on how to operate the equipment effectively. Small and medium-scale farmers may also struggle to access financing to purchase these tools, which limits their capacity to invest in value-added processes that could enhance their income. Moreover, the lack of infrastructure, such as electricity or reliable transportation, compounds the problem by making it harder to utilize these technologies effectively, especially in remote areas.

The digital divide is also an emerging technological constraint. As the global economy increasingly relies on digital platforms for marketing, sales, and distribution, farmers who lack access to the internet or smartphones are at a significant disadvantage. According to a study by Manyeki et al. (2020), farmers in rural areas often have limited access to digital technologies, which hinders their ability to market value-added products, access online training resources, or engage in digital marketplaces. The inability to leverage digital tools further isolates these farmers from global and regional market opportunities, making it difficult for them to add value to their agricultural products.

Overall, technological constraints significantly hinder the ability of small and medium-scale farmers to engage in value addition activities. Limited access to modern processing technologies, specialized equipment, and technical knowledge prevents farmers from improving the value of their products. To overcome these barriers, it is essential to improve access to affordable technologies, provide technical training, and foster innovation through research and development. By

addressing these technological challenges, smallholder farmers can enhance their productivity, improve the quality of their products, and increase their income.

2.3. Financial Constraints and Access to Capital

Access to capital is one of the most significant challenges faced by small and medium-scale farmers, particularly in developing countries like Zambia, where farmers struggle to fund value addition activities that could enhance the quality, appeal, and profitability of their agricultural products. Financial constraints limit farmers' ability to invest in modern processing technologies, purchase necessary equipment, and improve their infrastructure, which are essential for value addition. This section will explore the key financial challenges these farmers face and examine the role of financial institutions, government support, and other funding mechanisms in promoting value-added agricultural activities.

One of the primary financial barriers is limited access to credit and loans. Smallholder farmers are often unable to access formal credit due to their lack of collateral, insufficient financial records, and perceived risk by lending institutions. According to a study by Fafchamps et al. (2021), many small and medium-scale farmers in sub-Saharan Africa face challenges in obtaining loans for investment in value addition. Traditional banks and financial institutions often consider smallholder farming as a high-risk sector and are reluctant to provide loans, especially for capital-intensive activities like processing and marketing. As a result, farmers may turn to informal sources of credit, such as local money lenders or community-based savings groups, but these often come with high interest rates, making them unaffordable for farmers looking to invest in value addition (Fafchamps et al., 2021).

Government support and subsidies are also critical factors in overcoming financial constraints. In many cases, governments provide funding or subsidies to support farmers in adopting value addition practices, but the availability of such support is often limited, inconsistent, or not well-targeted. As noted by Kabwe et al. (2022), while Zambia's government has implemented various agricultural support programs aimed at boosting productivity, there is still limited financial support directed specifically at promoting value addition. Furthermore, the allocation of government subsidies and grants is often skewed toward large-scale commercial farmers, leaving smallholders with limited access to the financial resources necessary to scale up their operations (Kabwe et al., 2022). Inadequate government intervention also stems from the lack of structured financial frameworks to directly address the capital needs of small-scale farmers involved in value addition.

Another notable funding source is cooperatives, Farmers' cooperatives have become an important vehicle for pooling resources and accessing funding, both from government and non-governmental organizations (NGOs). Through cooperatives, smallholders can collectively negotiate for better financial terms and access loans or grants that would otherwise be unavailable to them individually. According to Mufulira et al. (2021), cooperatives have enabled farmers to access shared processing facilities and technology, thus facilitating value addition at a lower cost. Cooperatives also provide training and capacity-building programs that help farmers better manage their finances and operations, improving their ability to invest in value addition.

Thus, it can be argued that financial constraints are a significant barrier to value addition in agriculture, particularly for small and medium-scale farmers. Limited access to credit, high interest rates, and insufficient government support are key challenges that prevent farmers from investing in value-added activities. However, alternative funding mechanisms, such as microfinance institutions, crowdfunding, and cooperatives, provide potential solutions to address these financial challenges. For value addition to succeed in Zambia, it is essential to improve access to affordable and flexible financing options tailored to the needs of smallholder farmers.

2.4. Infrastructural Barriers to Value Addition

Infrastructural limitations are one of the key barriers to value addition in agriculture, especially in developing regions like sub-Saharan Africa. Inadequate infrastructure significantly hinders the efficiency of agricultural production, processing, and the marketing of value-added products. Critical infrastructural issues such as poor roads, lack of storage facilities, and absence of processing plants prevent small and medium-scale farmers from fully realizing the potential of value addition. This section will explore these infrastructural challenges and their impact on the agricultural value addition process, particularly in Zambia, and how they affect the flow of agricultural products from farms to markets.

One of the most pervasive infrastructural constraints in agriculture is poor transportation networks. Roads are often poorly maintained or entirely absent in rural farming areas, which impedes the efficient transportation of both raw and processed agricultural products to markets. Poor road conditions increase transportation costs, reduce the shelf-life of perishable goods, and limit farmers' access to broader markets. A study by Siham and Gumede (2020) on rural agricultural systems in Southern Africa found that inadequate road infrastructure increases transaction costs, thus reducing the overall profitability of value-added agricultural products. Without reliable access to markets, farmers are less incentivized to invest in value addition since they are unable to move their products efficiently or at competitive prices.

The lack of adequate storage facilities also represents a major infrastructural barrier to value addition. Smallholder farmers often struggle to store their produce in conditions that prevent spoilage, particularly for perishable products such as fruits, vegetables, and dairy. According to Kifayat et al. (2021), inadequate storage facilities lead to significant postharvest losses, which directly impact the profitability of farmers and limit the volume of products available for value addition. Storage challenges are particularly pronounced in remote areas where there are limited or no refrigeration or preservation facilities, which in turn hinders the production of high-quality processed goods. Without proper storage, farmers are compelled to

sell their produce immediately after harvest, often at low prices, rather than investing in value-added processes that could increase the products' market value.

The lack of integrated value chains due to poor infrastructure also affects the flow of agricultural products from farms to markets. A comprehensive and well-coordinated value chain, which includes producers, processors, distributors, and retailers, is essential for facilitating the movement of goods from production to consumption. However, as pointed out by Chisasa (2022), insufficient infrastructure hinders the development of integrated value chains, limiting farmers' access to high-value markets. For example, the lack of cold storage and processing facilities means that farmers are unable to process fresh produce into finished goods that could fetch higher prices in urban or international markets.

In conclusion, inadequate infrastructure in terms of transportation, storage facilities, processing plants, and energy supply severely limits the potential for value addition in agriculture. The lack of reliable roads and storage facilities increases postharvest losses, while the absence of processing plants prevents farmers from adding value to their agricultural products. To overcome these infrastructural challenges, it is essential for governments, development agencies, and private sector actors to invest in rural infrastructure, facilitate access to storage and processing technologies, and improve energy supply systems. Such investments would enable farmers to enhance the quality of their products, reduce costs, and improve their access to local, regional, and international markets, thereby fostering greater agricultural productivity and economic development.

2.5. Regulatory and Policy Constraints

Regulatory and policy constraints are significant barriers that limit the ability of small and medium-scale farmers to engage in value addition activities. These constraints can take various forms, including government policies, institutional support, and market regulations that either facilitate or obstruct the adoption of value-added agricultural practices. In Zambia, as in many other developing countries, the lack of a supportive policy framework and regulatory environment can prevent farmers from fully capitalizing on the economic potential of value addition, which is crucial for enhancing their income, improving agricultural productivity, and contributing to rural development.

One of the key regulatory challenges faced by smallholder farmers is the lack of coherent and supportive agricultural policies. Many policies in Zambia are either not well-targeted or are designed with large-scale commercial farming in mind, which leaves small-scale farmers at a disadvantage. According to Mufulira et al. (2021), the majority of agricultural policies in Zambia focus on increasing food production, often neglecting the critical aspect of value addition. This results in a situation where small-scale farmers are encouraged to focus on raw production without any significant incentives or support for transforming their produce into higher-value products. Furthermore, the lack of policies that prioritize rural and small-scale farming exacerbates the challenges smallholder farmers face in accessing resources such as credit, technology, and market opportunities for value-added products (Mufulira et al., 2021).

Another significant issue is market regulations that impact the ability of farmers to access value-added markets. Market regulations, such as import tariffs, export restrictions, and quality standards, can either facilitate or hinder the flow of value-added products from small-scale farmers to broader markets. For instance, the absence of clear market regulations and standards for value-added agricultural products can limit the ability of farmers to access international markets where consumers demand standardized products (Ngwira et al., 2020). According to an analysis by Chisasa and Kanu (2021), the lack of standardized regulations for processed agricultural goods in Zambia discourages smallholder farmers from engaging in value addition due to the uncertainty and costs associated with meeting international market standards.

Land tenure policies also impact value addition efforts. In Zambia, the issue of land ownership and security is critical for farmers who wish to invest in long-term value addition practices. A study by Kaluba et al. (2021) highlighted that unclear land tenure systems often discourage smallholder farmers from making investments in value addition, such as building storage facilities or purchasing processing equipment, due to the uncertainty surrounding land ownership. Without clear land tenure, farmers may lack the security necessary to invest in improving their agricultural practices or establishing processing operations for value-added products.

Additionally, subsidies and incentives are an essential aspect of government policy that can either encourage or discourage value addition. Although Zambia has provided subsidies for certain agricultural inputs, these incentives are often not directed toward value-added agricultural activities. According to research by Nkhoma et al. (2020), the absence of targeted subsidies for processing equipment or technology means that smallholder farmers are unable to adopt modern processing techniques that could enhance the value of their products. Furthermore, the lack of incentives for farmers to invest in value addition hinders their ability to scale up operations and participate in formal markets.

Finally, policy coordination between different government agencies is also an issue. In Zambia, agricultural policy is often fragmented, with various government agencies working in silos, which reduces the effectiveness of policy implementation. According to Mumba et al. (2022), lack of coordination between agricultural, trade, and industrial policies creates gaps that prevent farmers from accessing the full range of support they need to successfully engage in value addition. A more integrated policy approach that links agriculture, trade, and industrial development is necessary to promote value addition effectively.

Simply put, regulatory and policy constraints play a significant role in limiting the ability of small and medium-scale farmers in Zambia to engage in value addition. Policy gaps, insufficient institutional support, unclear market regulations, and restrictive trade policies create a challenging environment for farmers to invest in value-added agricultural activities. Addressing these constraints requires a comprehensive policy approach that provides targeted support for smallholder

farmers, improves market access, strengthens institutional capacity, and aligns agricultural policies with the needs of value addition. By improving policy coordination and offering incentives for value-added agriculture, Zambia can unlock the potential of smallholder farmers to increase their incomes and contribute to rural economic development.

2.6. Theoretical Framework

The Innovation Diffusion Theory (IDT), proposed by Everett Rogers in 1962, was the most suitable theoretical framework for this study. IDT explained how, why, and at what rate new ideas and technologies spread within a social system. The theory had been widely applied in understanding the adoption of agricultural innovations, including value addition techniques among smallholder farmers. Rogers identified several key components that influenced the adoption process: perceived relative advantage, compatibility, complexity, trialability, and observability. These elements helped explain why some small and medium-scale farmers in Chongwe District embraced value addition, while others faced barriers in adopting such innovations (Rogers, 2003).

In this study, IDT was particularly relevant as it allowed for the exploration of the factors that influenced farmers' decision-making processes when considering value addition practices. The theory's focus on perceived relative advantage highlighted how farmers viewed value addition as a means to increase income, improve product quality, and gain access to broader markets. The compatibility element helped in understanding how new practices aligned with the existing agricultural techniques and resources available to farmers in Chongwe District. Additionally, complexity and trialability focused on whether the value addition techniques were perceived as easy to implement and whether farmers could experiment with these innovations on a small scale before committing to large-scale adoption.

Furthermore, the theory stressed the importance of social networks and communication channels, which played a significant role in the diffusion process. The availability of information through agricultural extension services, peer learning, and community-based networks in Chongwe District was crucial in understanding how value addition practices spread and were adopted. The social system element in IDT was vital for considering the institutional and regulatory barriers that influenced the adoption of value addition innovations (Rogers, 2003).

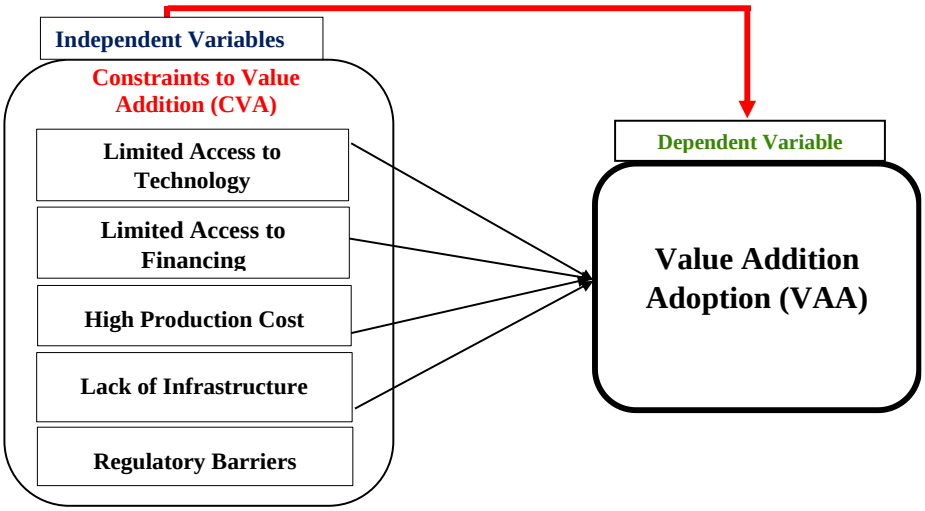
2.7. Empirical Review

- Roy, Mukherjee, and Bhaduri (2019) explored the role of value chains and value addition in enhancing the economic outcomes of smallholder farmers in South Asia. Using a mixed-methods approach, the study combined qualitative interviews (n = 50) and quantitative surveys (n = 150) with farmers and value chain stakeholders in India and Bangladesh. The findings indicated that value chains significantly increased farmers' incomes through improved market access and product diversification. However, barriers such as high transaction costs, lack of storage facilities, and limited access to finance hindered the broader adoption of value addition practices. The critique of this study lies in its small sample size and regional focus, which limits the ability to generalize findings to broader global agricultural contexts, especially those with different farming structures.
- Erenstein, Haug, and Ochieng (2021) investigated the impact of technological interventions on value addition in sub-Saharan Africa. They employed a survey approach with a sample of 200 farmers from Kenya and Tanzania, supplemented by field visits and interviews with local stakeholders. The study concluded that adopting modern processing technologies, such as solar dryers and milling machines, led to a 25% increase in the value of processed goods. However, access to these technologies remained constrained due to high costs and limited training. A limitation of this study is that its findings are confined to a small sample size and region, which may not be reflective of the broader sub-Saharan African context.
- Bisht, Prasad, and Aggarwal (2020) aimed to analyze the role of financial support in promoting value addition activities among smallholder farmers in India. The study used a quantitative approach and surveyed 100 smallholder farmers who had received financial assistance for value addition activities. The findings showed that financial support improved farmers' access to processing equipment, resulting in higher-quality products and better market access. However, the study also noted that inconsistent government policies and high-interest rates limited the long-term sustainability of financial support. The critique of this study lies in its limited scope, as it focused on a small and geographically limited sample, thus not fully representing the experiences of all smallholder farmers in India.
- Sunding and Zilberman (2020) examined the role of policy interventions and market reforms in fostering value-added agriculture in developing countries. The study reviewed existing policy frameworks in 12 countries and analyzed their effectiveness in promoting value addition through qualitative interviews with policymakers and agricultural experts. The study concluded that value addition was most successful when policies were coordinated with market incentives and subsidies for smallholder farmers. However, it highlighted that inconsistent policy enforcement led to unequal access to resources. A limitation of this study was its reliance on secondary data and interviews with policymakers, rather than primary data from farmers, which might have provided more practical insights.
- Kabwe, Mumba, and Kaluba (2022) assessed the impact of government agricultural support programs on the value addition activities of smallholder farmers in Zambia. A mixed-methods approach was employed, including a survey of 150 farmers and in-depth interviews with 20 government officials and NGO representatives. The study found that government support programs improved farmers' access to inputs and training, but challenges such as delayed disbursements and lack of tailored support limited the effectiveness of these programs in promoting value addition. The critique of this study is its focus on one region in Zambia, which limits the ability to generalize the findings to the

entire country.

- Zulu and Chisanga (2022) explored the challenges faced by smallholder farmers in Zambia regarding access to value-added agricultural markets. Using a survey methodology with 120 smallholder farmers and 10 value chain actors (processors, traders) in rural Zambia, the study found that farmers faced significant barriers to market access, including poor road infrastructure, lack of cold storage, and limited market information. While the findings were insightful, the study did not sufficiently address how government policies or financial mechanisms could mitigate these challenges, which would have provided a more comprehensive understanding.

2.8. Conceptual Framework



Source: Author's Compilation, 2024

The conceptual framework above demonstrates four independent variables, namely, Limited Access to Technology, Limited Access to Financing, High Production Cost, Lack of Infrastructure and Regulatory barriers, and how they influence Value Addition Adoption among Smallholder farmers in Chongwe, Zambia.

3. Research Methodology

3.1. Research Philosophy

The research philosophy guiding this study was pragmatism, which emphasizes the use of practical methods to address real-world problems and generate actionable solutions. Pragmatism, as a philosophical approach, is not tied to any specific method but instead focuses on combining multiple approaches to better address the research questions (Creswell, 2014). This philosophy is particularly relevant for this study, as it seeks to understand the constraints small and medium-scale farmers in Chongwe District face in adding value to their agricultural products, a complex problem that requires both numerical data and contextual understanding.

3.2. Research Design

A mixed methods research design was adopted for this study, combining both quantitative and qualitative approaches to gather and analyse data in a comprehensive manner. The quantitative component involved the use of structured survey, employing a detailed questionnaire that was designed to collect numerical data regarding the constraints and interventions related to value addition in agricultural products. The survey provided measurable data that could be statistically analysed to identify common trends, patterns, and relationships among the constraints faced by small and medium-scale farmers in Chongwe District. This allowed for a broad understanding of the extent to which these constraints affect the farmers and their ability to engage in value addition.

The qualitative component of the study involved key informant interviews, which provided an opportunity for more in-depth exploration of experiences, expert opinions and insights. This flexible interview format allowed the researcher to ask open-ended questions, enabling participants to share their perspectives in their own words. The interviews offered richer, more detailed data that complemented the quantitative findings by providing context, personal narratives, and a deeper understanding of the challenges farmers face. It also allowed for the exploration of specific barriers and potential solutions that might not have been fully captured through the structured survey alone.

3.3. Sampling Design

Target Population

A population is a group of individuals or objects from which samples are taken for measurement. It is a collection of all the elements about which a study wishes to make some inferences (Cooper, et al., 2003). The study population consisted of approximately 3,000 small and medium-scale farmers in Chongwe District, Zambia, as estimated by the Zambian Ministry of Agriculture (2022). This population included farmers engaged in both crop and livestock farming, with a diverse range of farm sizes, resources, and farming practices. The study specifically targeted individuals with at least one year of agricultural experience to ensure they could provide valuable insights into the constraints and opportunities related to value addition. Furthermore, extension officers who are knowledgeable and specialised were interviewed to explore the constraints and opportunities to value addition.

Study Sample Size

The sample size for the quantitative component of this study was calculated using Yamene's (1967) sample size formula, which is commonly used in social sciences to determine sample sizes for survey-based research. The formula is as follows:

$n=N/(1+N\ 〖(e)^2)$

Where:

n= sample size

N= total population (3,000)

e= margin of error (0.05)

$n=N/(1+N\ 〖(e)^2) =3000/\ (1+3000\ 〖\ (0.05)^2) \approx 353$

The sample size was rounded to approximately 353 farmers. The sample size of 353 farmers for this study was adequate as it provided a reliable representation of the target population of small and medium-scale farmers in Chongwe District, Zambia. Cochran (1977) suggests that for a population of approximately 3,000, a sample size between 350-400 ensures precision and allows for generalisability of the results to the broader population.

3.4. Sampling Techniques

Simple random sampling was employed to select respondents for the quantitative component, ensuring that every small and medium-scale farmer in Chongwe District had an equal chance of being chosen. This approach minimised selection bias and enhanced the representativeness of the sample, allowing for the generalisation of the findings to the larger population of farmers in the district. The use of random sampling helped to ensure a diverse representation of respondents, capturing a wide range of demographic factors such as age, gender, farming experience, and farm size. This diversity was crucial for understanding the varying constraints and experiences of farmers across different groups, thereby providing a more comprehensive view of the factors affecting value addition practices in the district (Sekaran & Bougie, 2016).

For the qualitative component, the sampling strategy involved a combination of purposive and snowball sampling techniques to select participants for KIIs. Under purposive sampling, the extension officers with in-depth knowledge and experience were identified and selected. While under snowball sampling, the selected extension officers were asked to recommend additional key informants who could provide valuable insights and perspectives on value addition.

3.5. Data Collection Instruments

The data for this study were collected using two data collection instruments designed to gather both quantitative and qualitative data. The first instrument was a survey questionnaire, which was administered to farmers on value addition to gather quantitative data. This questionnaire included a combination of closed-ended questions and Likert scale items. The closed-ended questions provided clear, specific responses, allowing for easy categorisation and statistical analysis of data related to the constraints of value addition. The Likert scale questions enabled the researcher to assess the extent to which farmers agreed or disagreed with various statements related to value addition barriers and the effectiveness of proposed interventions. This structured approach allowed for the collection of measurable data, which could be analysed quantitatively to draw conclusions about the key constraints and possible solutions that farmers in Chongwe District face when adding value to their agricultural products.

The key informant interview guide was administered to extension officers to collect qualitative data. The KIIs with extension officers helped address the study objectives and answer the principal research questions. The use of qualitative data helped explain or added perspective to quantitative data. The combination of qualitative and quantitative methods ensures a balanced analysis and understanding as well as provision of insight, thereby helping improve both the validity and reliability of the study results. Mixed-methods studies, which include both quantitative and qualitative methods, are said to "result in a stronger, more complete evaluation" (CARE International, 2018).

3.6. Data Collection Procedure

The survey questionnaires were administered to farmers through face-to-face interviews, a method that allowed for direct interaction between the enumerators and the respondents.

The KII guide was administered in person, which allowed participants to share their expert opinions and provide more detailed insights into the farming practices and the challenges farmers faced in value addition. These interviews provided a platform for extension workers to elaborate on the constraints and potential interventions that were not easily captured by the survey with farmers.

3.7. Data Processing and Analysis

The quantitative data were analysed using SPSS version 29 by running descriptive statistics, which allowed for the summarisation of demographic characteristics of the respondents as well as the frequency and distribution of constraints related to value addition. Descriptive statistics, including measures of central tendency (such as means) and measures of dispersion (such as standard deviations), were used to provide an overview of the data, helping to identify common trends and characteristics among the sample of small and medium-scale farmers in Chongwe District. Additionally, inferential statistical techniques, such as chi-square tests and regression analysis, were employed to explore potential relationships between the identified constraints and the adoption of value addition practices. The chi-square test was particularly useful for determining whether there were statistically significant associations between categorical variables, such as gender and access to technology. Regression analysis, on the other hand, allowed for the testing of causal relationships and the impact of specific constraints on value addition adoption.

Qualitative data gathered from the KIIs were analysed using thematic analysis, which enabled the identification and interpretation of patterns, themes, and insights related to the constraints and potential interventions for promoting value addition. Thematic analysis is an inductive method that focuses on identifying recurring themes across the data, allowing the researcher to explore participants' perceptions and experiences in more depth. By organising the data into categories based on key themes, such as technological barriers or financial constraints, the researcher was able to gain a richer understanding of the challenges farmers face in implementing value addition practices. To aid in this process, NVivo software was utilised to organise, categorise, and code the qualitative data systematically (Braun & Clarke, 2006).

4. Research Results and Analysis

4.1. Demographics Characteristics

Gender Distribution

The gender distribution in Table 1 below shows that 78.7% of the respondents were male, while 21.3% were female. This indicates a significant gender disparity in the representation of small and medium-scale farmers in Chongwe District, with a higher proportion of male farmers. The underrepresentation of female farmers may reflect broader gender dynamics in agriculture, where men are often more engaged in farming activities, particularly in rural areas. The gender imbalance could also suggest that women may face additional barriers to participation in agriculture, such as limited access to land, resources, or decision-making processes. This finding is important for understanding the constraints and challenges that may be specific to female farmers in Chongwe District. It highlights the need for targeted interventions to address gender inequalities in agricultural value addition, ensuring that both male and female farmers have equal opportunities to participate in and benefit from value-added activities. These results could inform policies aimed at promoting gender inclusivity in the agricultural sector.

Table 1: Gender Distribution

	Frequency	Percent
Female	58	21.3
Male	214	78.7
Total	**272**	**100.0**

Source: Author's computation, 2024

Age Distribution

The age distribution chart in Figure 1 below provides insight into the age range of the respondents in this study. The largest proportion of respondents, 37.9%, fell within the 41-50 years age group, followed by 30.5% of respondents in the 31-40 years age range. The third-largest group was respondents below 30 years, making up 20.6% of the sample. The smallest group was those aged above 51 years, at 11%. This distribution suggests that the majority of small and medium-scale farmers in Chongwe District, as represented in this sample, are middle-aged (41-50 years), which is typically the age range for individuals with significant farming experience and responsibility. Younger farmers (below 30 years) also represent a considerable portion of the sample, indicating potential growth in the agricultural sector from younger generations. However, the lower percentage of older farmers (above 51 years) could point to the aging farming population in the area or a lower participation rate among older individuals. This age distribution offers valuable insights into the demographic composition of farmers in the district and may help inform policies and interventions aimed at supporting farmers across different life stages.

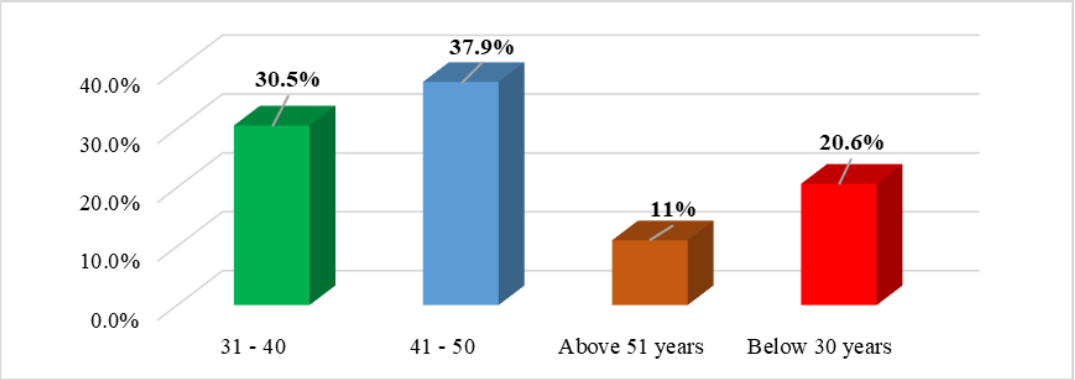


Figure 1: Age Distribution

Education Level

The education level distribution in this study shows that the majority of respondents, 53.3%, had completed secondary education, followed by 25.4% who had attained primary education. A smaller proportion of respondents had either no formal education (3.7%), completed college (14.3%), or reached university level (3.3%). This indicates that the farming population in Chongwe District predominantly has at least some formal education, with the majority having secondary-level education.

In the context of the study, this education distribution suggests that while farmers may not have university degrees, they possess enough educational background to understand and engage with value addition practices. However, the relatively small proportion of farmers with higher education levels might reflect challenges in accessing higher education in rural areas. The study could explore how the level of education impacts farmers' ability to adopt value addition techniques, with those having secondary or higher education possibly being more receptive to technological and managerial interventions. Furthermore, the findings could suggest the importance of providing training that aligns with the education levels of farmers, ensuring that the interventions are accessible and practical for the majority of the population.

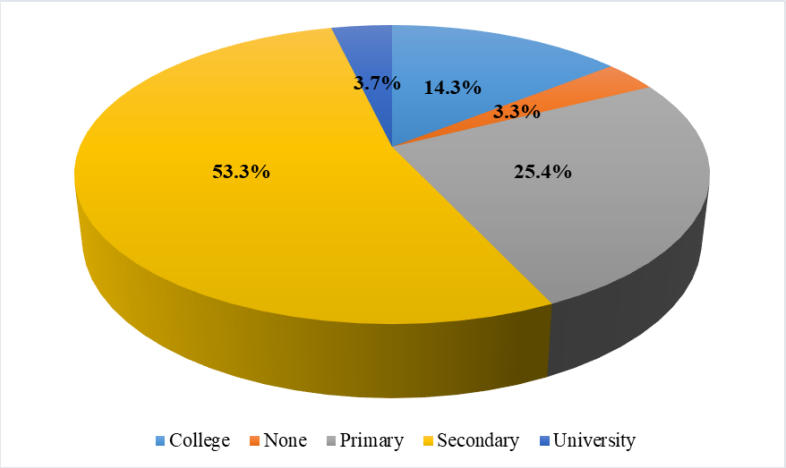


Figure 2: Education Level of Participants
Source: Author's Compilation from Excel, 2024

4.2. What are the constraints of value addition to agricultural products in Chongwe District among small and medium scale farmers?

The data presented in Table 2 highlights the constraints faced by small and medium-scale farmers in Chongwe District when attempting to add value to their agricultural products. Limited access to technology was the most widely recognised constraint, with 219 respondents (80.5%) strongly agreeing and 52 respondents (19.1%) agreeing, while only 1 respondent (0.4%) disagreed. This indicates that technology access is a significant barrier to value addition and that this issue is nearly universal among the respondents. Similarly, limited access to financing was identified as a major obstacle, with 237 farmers (87.1%) strongly agreeing and 33 farmers (12.1%) agreeing. This shows that financial constraints are critical challenges for farmers seeking to invest in value addition. The absence of disagreement on this matter further underscores the importance of financial access in facilitating value-added agricultural activities.

High production costs were also recognised as a constraint, with 167 farmers (61.4%) strongly agreeing and 94 farmers (34.6%) agreeing, but 4 respondents (1.5%) were neutral, and 6 respondents (2.2%) disagreed. This suggests that while high production costs are seen as a significant barrier by most, there are variations in how this issue is perceived, likely depending on farm size or efficiency. The lack of infrastructure, such as roads, storage, and processing facilities, was acknowledged by 82 farmers (30.1%) who strongly agreed and 132 farmers (48.5%) who agreed, though 50 respondents

(18.4%) were neutral, and 7 respondents (2.6%) disagreed. This indicates that while infrastructure is a notable constraint, its impact may differ across regions or farming operations. Finally, regulatory barriers, including complex policies and restrictions, were highlighted by 37 farmers (13.6%) who strongly agreed and 97 farmers (35.7%) who agreed. However, a notable portion of respondents (85, or 31.2%) remained neutral, and 53 respondents (19.5%) disagreed, suggesting that perceptions of regulatory challenges vary.

Table 2: Constraints of Value Addition

Choice	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Limited access to technology	219	52	0	1	0
Limited access to financing	237	33	1	1	0
High production costs	167	94	4	6	1
Lack of infrastructure	82	132	50	7	1
Regulatory barriers	37	97	85	50	3

Source: Author's Compilation from SPSS 29, 2024

4.3. Other Constraints of Value Addition

The responses related to any other constraints of value addition to agricultural products that one may know revealed several recurring themes, which were coded and analysed to understand the constraints smallholder farmers in Chongwe District face in adding value to their agricultural products. These themes were identified through repeated mentions in the responses, and key phrases were extracted to categorise the main barriers and interventions required. The analysis used a combination of qualitative coding methods and thematic analysis, leading to the identification of six primary themes as shown in the subsequent paragraphs.

Access to Financial Support: A dominant theme across responses was the difficulty farmers face in accessing financial resources, particularly loans with low interest rates and subsidies for inputs and machinery. Farmers expressed the need for more active financial support, with some stating, "Give loans to farmers, subsidise inputs," and "Provide more farming inputs." These statements highlight the financial challenges in acquiring the necessary resources to engage in value addition, particularly due to high interest rates and the lack of collateral. The theme indicates that improved financial access is vital for farmers to invest in value addition activities.

Training and Capacity Building: The need for better training and skills development in value addition techniques such as processing, packaging, and marketing was another recurring theme. Many respondents emphasised that training in new technologies and understanding market demands were crucial for improving the quality of their value-added products. Quotes like, "Just an emphasis on training in new technologies," and "More sensitisation on value addition," reflect the widespread recognition among farmers of the importance of learning and adopting new techniques to enhance the value of their agricultural products.

Infrastructure Development: A significant number of responses highlighted infrastructure deficiencies, particularly poor road conditions, lack of storage facilities, and absence of local processing factories. One respondent mentioned, "Put factories in the area," while another said, "Improving road infrastructure." These responses underscore the need for infrastructure development to facilitate the transportation and processing of agricultural products locally, which would reduce costs and improve efficiency in value addition activities.

Government Policies and Regulations: Several farmers pointed out the importance of government policies in supporting value addition. The need for less bureaucratic and more efficient regulatory processes was emphasised, with responses such as, "Make laws that deliberately promote value addition," and "The regulatory process should be made quicker and less complicated." Some also suggested that the government should prevent foreign products from undercutting local farmers by regulating market imports, particularly of potatoes and onions. This shows the role of policy in either supporting or hindering the value addition process.

Market Access: The theme of improving market access for farmers' value-added products emerged as another major concern. Respondents suggested that more government support in securing market access and promoting local products could improve sales. As one participant stated, "Encourage the public to buy local products," and another noted, "Regulate the markets to favour locals first." This highlights the importance of both market linkages and promoting local products to strengthen the demand for value-added agricultural goods.

Investment in Technology: Finally, many respondents indicated the need for investments in affordable, modern technologies such as solar dryers, grinding mills, and packaging machines. One respondent stated, "More investment in machinery," and another added, "Providing access to appropriate technology and equipment for value addition." This theme emphasises that affordable technology is key to reducing postharvest losses and enhancing the value-added potential of farmers' products.

Table 3: Other constraints

	Frequency	Percent	Valid Percent	Cumulative Percent
Market Access				
Access to markets	19	7.0	7.0	7.0
Access to markets and consumer confidence	1	0.4	0.4	7.4
Consumers prefer imported products	2	0.7	0.7	8.1
There is no market	1	0.4	0.4	8.5
Competition				
Competition in the market against big companies	1	0.4	0.4	8.9
Unfair competition on the market	1	0.4	0.4	9.3
Education and Awareness				
Lack of education	3	1.1	1.1	10.4
Awareness	1	0.4	0.4	10.8
Educate farmers	2	0.7	0.7	11.5
Sensitization	7	2.6	2.6	14.1
Financial Constraints				
Limited access to financing	3	1.1	1.1	15.2
Farming inputs are expensive	1	0.4	0.4	15.6
Loans are not available	1	0.4	0.4	16.0
The major issue is finances	1	0.4	0.4	16.4
Production and Resources				
High production costs	1	0.4	0.4	16.8
Shortage of farming inputs	2	0.7	0.7	17.5
Inadequate handling and storage	1	0.4	0.4	17.9
Machinery	1	0.4	0.4	18.3
Government and Regulatory Issues				
Government intervention for small scale farmers	1	0.4	0.4	18.7
Government regulations	1	0.4	0.4	19.1
Miscellaneous				
Harsh economy	1	0.4	0.4	19.5
People are not well informed	1	0.4	0.4	19.9
Trust from consumers	1	0.4	0.4	20.3
Very few institutions have the interest of farmers	1	0.4	0.4	20.7

In examining additional constraints of value addition, the findings highlighted several factors affecting farmers' productivity. Market access emerged as a significant concern, although it was reported less frequently than other constraints, with 19 respondents indicating limited access to markets and only one noting issues with consumer confidence with a single response for preferences for imported products. Competition against larger companies was noted by a few respondents as a minor obstacle. Education and awareness appeared to be recognized as constraints as well, with three respondents highlighting a lack of education and awareness about market opportunities and practices. Financial limitations were also reported, although infrequently, with three respondents emphasizing limited access to financing as a critical issue. Production-related challenges included high production costs and shortages of farming inputs, while regulatory concerns were limited to few mentions regarding government intervention and regulations. Generally, the data underscored a complex web of factors impacting value addition in agriculture, with limited access to technology and financing recognized as predominant issues by the farmers surveyed.

4.4. Extent of Constraints on Value Addition

The data presented in Table 4 highlights the extent to which various constraints affect small and medium-scale farmers in Chongwe District in terms of value addition. Limited access to technology is the most significant constraint, with 214 respondents (78.8%) reporting that it affects them to a very great extent, and 56 respondents (20.6%) reporting that it affects them to a great extent. This indicates that access to technology is a major barrier to value addition in the district, with few farmers perceiving it as having minimal or no effect.

Limited access to financing also emerged as a critical constraint, with 233 farmers (85.8%) stating that it affects them to a very great extent, and 36 farmers (13.2%) indicating a great extent. Only 1 farmer reported a minimal effect, underscoring the importance of financial support for smallholders in overcoming barriers to value addition. High production costs were noted by 140 farmers (51.5%) as a very great extent constraint, and 122 farmers (44.9%) felt it affected them to a great extent. A small percentage, 3 farmers (1.1%), were neutral, and 6 farmers (2.2%) disagreed, suggesting that while high production costs are generally recognised as a barrier, their effect may vary based on farm size or efficiency.

Lack of infrastructure, including roads and processing facilities, was noted by 77 farmers (28.3%) as a very great extent constraint, and 97 farmers (35.7%) indicated it affected them to a great extent. A significant number of respondents (28,

or 10.3%) were neutral, and 66 (24.3%) reported minimal effect, showing that the lack of infrastructure is perceived differently depending on location or type of farming. Finally, regulatory barriers were seen to affect 19 farmers (7%) to a very great extent, with 38 farmers (14%) reporting a great extent. However, 37 farmers (13.6%) were neutral, and a large portion, 145 farmers (53.3%), indicated minimal effect. This suggests that while some farmers feel hindered by regulations, many perceive them as a lesser constraint, possibly due to varying degrees of regulatory enforcement or the nature of the regulations.

Table 4: Extent of Effect of Constraints on Value Addition

Choice	Very Great Extent	Great Extent	Neutral	Minimal Extent	No Effect
Limited access to technology	214	56	2	0	0
Limited access to financing	233	36	1	1	0
High production costs	140	122	3	6	1
Lack of infrastructure	77	97	28	66	1
Regulatory barriers	19	38	37	145	33

Source: Author's Compilation from SPSS 29, 2024

4.5. How do value addition constraints influence the adoption of value addition practices among small and medium-scale farmers in Chongwe District?

In order to address the perceived effects of constraints on value addition to agricultural products, several recurring themes were identified and coded into distinct categories that reflect the most pressing challenges that small-scale farmers face in Chongwe District. These themes include limited access to technology, limited access to financing, high production costs, lack of infrastructure, and regulatory barriers.

Limited Access to Technology

The chart in Figure 3 below illustrates the key issues faced by small-scale farmers in Chongwe District related to limited access to technology, which significantly affects their ability to add value to their agricultural products. The largest proportion of respondents (37.5%) reported that limited access to technology results in "overall reduced productivity and quality." This suggests that farmers believe the lack of modern technological tools directly impacts their ability to improve both the quantity and quality of their produce.

Additionally, 18.4% of respondents noted that "high costs of technology hinder investment," pointing to financial constraints as a major barrier to adopting new technologies that could improve productivity. Similarly, 14.7% of farmers mentioned that "limited access to machinery reduces productivity," while another 14.7% cited "poor network limits market access," indicating that inadequate infrastructure, including communication and connectivity, hampers their ability to sell products effectively. Finally, 14.7% of farmers also reported that "inability to diversify crops due to lack of irrigation" is another result of limited access to technology, showing that the lack of irrigation systems limits farmers' ability to grow a wider variety of crops and improve their production processes.

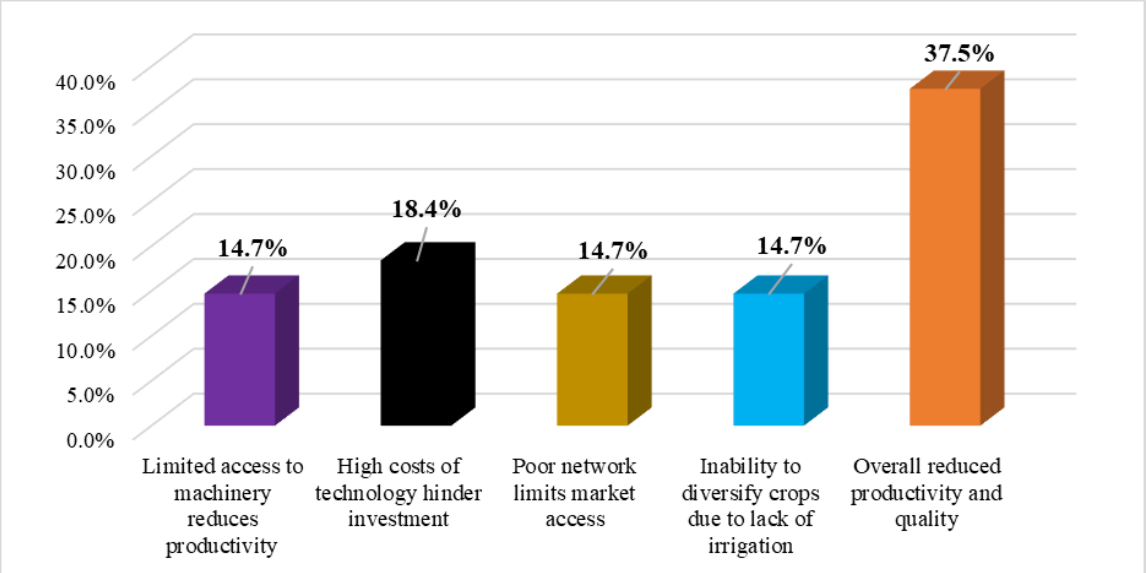


Figure 3: Limited access to technology
Source: Author's Compilation from Excel, 2024

Limited Access to Financing

The chart illustrates the key constraints related to "limited access to financing" faced by small-scale farmers in Chongwe

District, Zambia. The largest proportion of respondents (36.8%) indicated that "overall reduced productivity" is the primary effect of limited access to financing. This suggests that farmers perceive their inability to secure funding as a major factor hindering their productivity, which impacts their ability to scale up or improve farming practices for better value addition.

The second most significant response (18.4%) was "inability to purchase necessary inputs." This highlights the financial barrier preventing farmers from acquiring the essential resources—such as seeds, fertilizers, and tools—that are crucial for increasing productivity and engaging in value-added agricultural activities. Similarly, 18.4% also noted that "difficulty in investing in machinery" is a critical constraint. This reflects the challenge of obtaining capital to invest in necessary technology that could enhance the quality and efficiency of farming processes.

Other responses include 14.7% who identified "limited ability to manage risks like crop failure" as a result of financial limitations. Without sufficient funding, farmers may not be able to invest in risk management practices or insurance. Lastly, 11.8% of farmers stated that "high interest rates discourage borrowing," which points to the burden of costly loans in the area, further limiting their ability to access the capital needed for investment in agriculture.

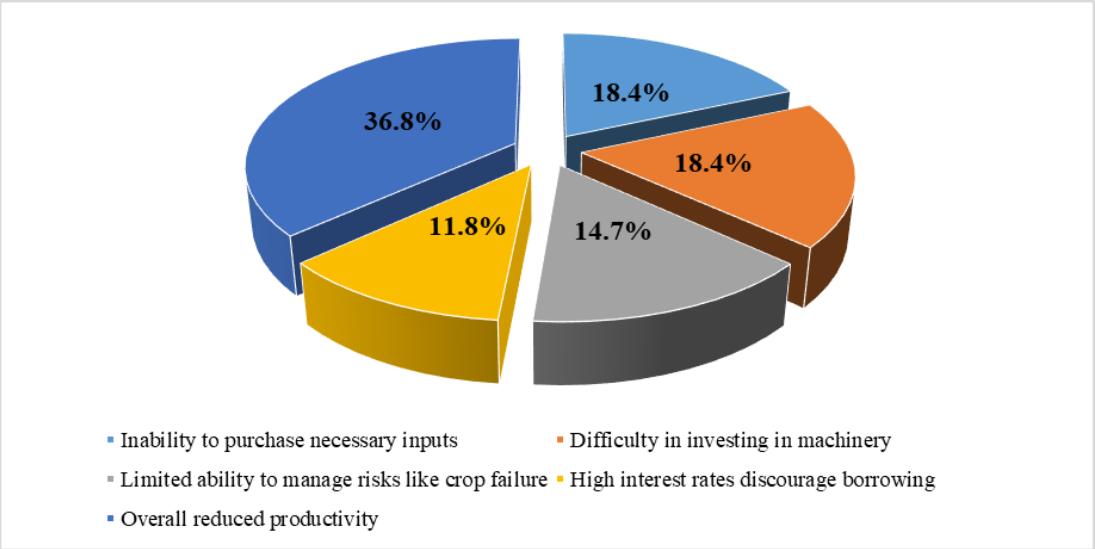


Figure 4: Limited Access to Financing
Source: Author's Compilation from Excel, 2024

High Production Costs

The data in Table 5 highlights how high production costs affect small and medium-scale farmers in Chongwe District, Zambia, in terms of value addition to agricultural products. A significant 48.5% of respondents indicated that high production costs led to an "overall reduced willingness to invest in value addition." This suggests that the financial burden of high production costs, such as input and transportation costs, discourages farmers from investing in practices that could increase the value of their products, ultimately limiting their ability to engage in value-added agricultural activities.

Additionally, 18.4% of respondents stated that "high input costs reduce profit margins," and another 18.4% mentioned that "increased transportation costs limit market access." Both of these factors contribute to financial constraints, making it more challenging for farmers to engage in value addition practices. With reduced profit margins and limited market access, farmers face difficulties in investing in the necessary resources for value addition, such as equipment or processing technologies.

Furthermore, 14.7% of respondents noted that "limited investment in quality improvement due to costs" was another consequence of high production costs. This points to the fact that farmers are unable to invest in improving the quality of their products due to the financial strain caused by high production costs.

Table 5: High Costs of Production

Key Ways High Costs Affect Farmers	Frequency	Percent
High input costs reduce profit margins	50	18.4
Increased transportation costs limit market access	50	18.4
Limited investment in quality improvement due to costs	40	14.7
Overall reduced willingness to invest in value addition	132	48.5
Total	272	100.0

Source: Author's Compilation from SPSS 29, 2024

Lack of Infrastructure

The data in Table 6 below provides insights into how the lack of infrastructure affects small and medium-scale farmers in

Chongwe District, Zambia, particularly in relation to value addition to agricultural products. The most prominent issue highlighted by the respondents was the "overall reduced competitiveness in the market," with 120 farmers (43.5%) indicating that inadequate infrastructure directly impacted their ability to compete effectively. This suggests that infrastructure deficiencies, such as poor roads and limited storage, hinder farmers' ability to access markets and improve their product quality, reducing their competitive edge in the agricultural sector.

Additionally, 23.2% of respondents noted that "limited access to markets due to infrastructure issues" was a significant challenge, indicating that poor roads and transportation networks make it difficult for farmers to reach larger, more profitable markets. Similarly, 17.3% of farmers pointed out that "poor road conditions increase transportation costs," further compounding the difficulties farmers face in distributing their products. Increased transportation costs reduce the profitability of agricultural products and make value-added practices less viable due to higher logistical expenses. Moreover, 16.1% of respondents indicated that "insufficient storage leads to spoilage," highlighting the importance of proper infrastructure in preventing postharvest losses. Without adequate storage facilities, farmers face difficulties in preserving their products for sale or further processing, resulting in wasted resources and reduced opportunities for value addition.

Table 6: Lack of Infrastructure

Key Ways Infrastructure Affects Farmers	Frequency	Adjusted Percent
Poor road conditions increase transportation costs	47	17.3
Insufficient storage leads to spoilage	43	16.1
Limited access to markets due to infrastructure issues	62	23.2
Overall reduced competitiveness in the market	120	43.5
Total	272	100.0

Source: Author's Compilation from SPSS 29, 2024

Regulatory Barriers

The data presented in Figure 5 below of the chart highlights the effect of regulatory barriers on small and medium-scale farmers in Chongwe District, Zambia, with respect to value addition. The most significant barrier, according to the responses, is the "overall reduced ability to innovate," which was reported by 48.5% of farmers. This suggests that restrictive regulations, or the lack of supportive policies, hinder farmers from adopting new technologies and practices that could improve their agricultural productivity and value addition. Farmers are likely facing bureaucratic challenges, regulatory constraints, or lack of incentives for innovation, which prevent them from diversifying or improving their value-added products.

The second most recognised challenge, with 25.7% of respondents, is the "difficulty in obtaining necessary certifications." This barrier highlights the challenges farmers face in meeting the regulatory requirements for producing and marketing value-added products, such as certifications for quality, safety, and hygiene. Without these certifications, farmers are unable to access higher-value markets, reducing their opportunities for income growth and market expansion. Furthermore, 14.8% of respondents noted that "competition with large-scale farmers due to regulations" is a significant issue. This suggests that smallholder farmers feel disadvantaged by regulatory frameworks that may favor large-scale agricultural operations, which have more resources to navigate complex regulatory requirements. This unequal playing field further limits smallholder farmers' ability to compete and succeed in value-added agricultural practices.

Finally, 11% of farmers highlighted that "costly compliance with regulations limits market access." The financial burden of adhering to regulatory requirements, such as fees for certification and inspections, restricts farmers' ability to access profitable markets. The costs associated with regulatory compliance may be too high for smallholder farmers, limiting their ability to engage in value addition activities and connect with larger markets.

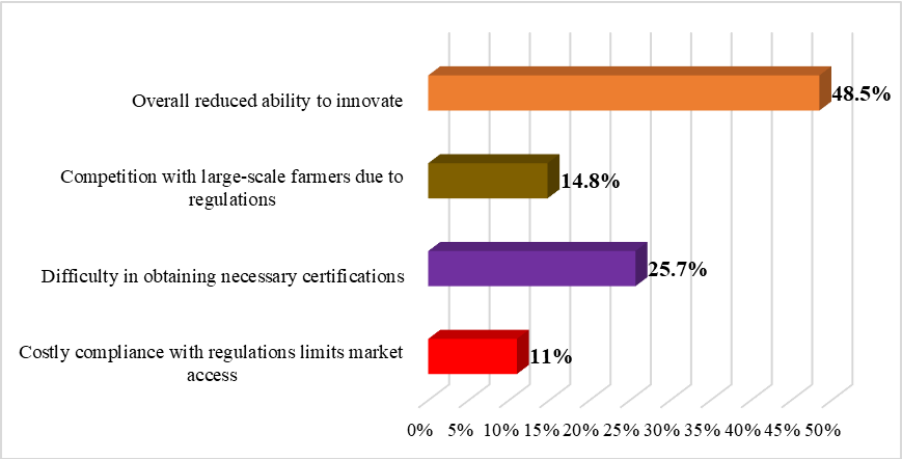


Figure 5: Regulatory Barriers

Source: Author's Compilation from Excel, 2024

4.6. What are the interventions that can promote value addition to agricultural products in Chongwe District among small scale farmers?

The data presented in Table 7 highlights the interventions that small and medium-scale farmers in Chongwe District believe would promote value addition in their agricultural activities. The overwhelming consensus among the farmers suggests that providing training and capacity building on value addition techniques, such as processing, packaging, and marketing, is crucial. A vast majority of respondents, 266 farmers (97.8%), strongly agreed with the importance of such training, while 3 (1.1%) agreed. Only a small fraction of farmers did not express agreement. This high level of agreement demonstrates that farmers see capacity building as essential for improving their ability to process and market their agricultural products, thereby increasing their market competitiveness.

Similarly, providing access to appropriate technology and equipment for value addition, such as solar dryers, grinding mills, and packaging machines, received significant support, with 269 farmers (98.9%) strongly agreeing and 2 (0.7%) agreeing. This response indicates that farmers recognise the importance of modern, affordable technologies to enhance the quality and value of their products. The ability to access such equipment would help reduce postharvest losses and expand their market opportunities, further enabling farmers to add value to their agricultural products.

Another key intervention identified was linking small-scale farmers to value chain actors, such as processors, retailers, and exporters, to help them access markets for value-added products. A total of 261 farmers (95.9%) strongly agreed, and 9 (3.3%) agreed. This shows that farmers view creating market linkages as a highly valuable strategy to improve their access to markets and secure better prices for their products.

Diversification into high-value cash crops such as cotton, tobacco, coffee, herbs, and floriculture also received considerable support, with 263 farmers (96.7%) strongly agreeing and 8 (2.9%) agreeing. This suggests that farmers recognise diversification as a viable strategy to increase income and reduce dependence on a few staple crops, enhancing the sustainability of their farming operations.

Finally, facilitating access to markets and market information was another critical intervention strongly supported by the farmers, with 263 (96.7%) strongly agreeing and 7 (2.6%) agreeing. These responses indicate that having up-to-date market information and better access to markets is essential for improving the competitiveness and profitability of smallholder farmers in Chongwe District. This finding reinforces the importance of market access in promoting value addition and improving the livelihoods of farmers in the district.

Overall, the findings from Table 4.7 demonstrate that small and medium-scale farmers in Chongwe District strongly support interventions aimed at enhancing capacity building, improving access to technology, creating market linkages, diversifying production, and facilitating market access. These interventions are viewed as key factors in overcoming the current constraints and enabling farmers to successfully add value to their agricultural products.

Table 7: Interventions that Promote Value Addition

Actions to Enhance Value Addition	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Training And Capacity Building on Value Addition Techniques	266	3	3	0	0
Access To Appropriate Technology and Equipment	269	2	1	0	0
Linking Small Scale Farmers to Value Chain Actors	261	9	2	0	0
Diversification Into Production of High-Value Cash Crops	263	8	1	0	0
Facilitating Access to Markets and Market Information	263	7	2	0	0

Source: Author's Compilation from SPSS 29, 2024

4.7. Multiple Regression Analysis

The results presented in Table 8 highlight the relationship between several constraints—limited access to technology, limited access to financing, high production costs, lack of infrastructure, and regulatory barriers—and the adoption of value addition practices by small and medium-scale farmers in Chongwe District. The multiple regression analysis was conducted to understand how these independent variables affect the dependent variable, which is the adoption of value addition practices in the agricultural sector which in return attempts to address objective 3 of this study.

The model's overall fit is indicated by an R value of 0.652, suggesting a moderate to strong relationship between the predictors (constraints) and the dependent variable (value addition adoption). The R Square value of 0.426 indicates that approximately 42.6% of the variance in value addition adoption can be explained by these five constraints. The Adjusted R Square value of 0.420, which accounts for the number of predictors and degrees of freedom, further confirms that the model fits the data reasonably well. The standard error of the estimate is 0.258, indicating the average deviation of the observed values from the regression line. A Durbin-Watson statistic of 1.518, which is within the acceptable range (1.5 to 2.5), suggests that there is no significant autocorrelation in the residuals, thereby supporting the assumptions of the

regression model.

In terms of statistical significance, the ANOVA results reveal that the regression model is statistically significant, with an F-value of 21.568 and a p-value of 0.000, well below the typical significance level of 0.05. This indicates that the model as a whole significantly explains the variation in value addition adoption among the farmers.

The unstandardized coefficients provide further insight into the individual effects of each constraint on value addition adoption. For example, limited access to technology has a positive effect on value addition adoption, with a coefficient of 0.265 and a t-value of 4.274 (p = 0.001). This suggests that improving access to technology would significantly enhance the adoption of value addition practices by farmers in the district. Similarly, limited access to financing also positively affects value addition adoption, with a coefficient of 0.185 and a t-value of 2.537 (p = 0.015), indicating that financial support is crucial in enabling farmers to invest in value addition practices.

Conversely, high production costs have a negative effect on value addition adoption, with a coefficient of -0.312 and a t-value of -7.091 (p = 0.000), suggesting that higher production costs discourage farmers from adopting value addition practices. This indicates that reducing production costs could improve the willingness of farmers to engage in value-added agricultural activities. Lack of infrastructure also has a positive effect on value addition adoption, with a coefficient of 0.210 and a t-value of 5.833 (p = 0.020). This suggests that improving infrastructure such as roads, storage, and processing facilities can support value addition practices by making it easier for farmers to access markets and improve product quality.

Regulatory barriers are another important constraint, with a negative effect on value addition adoption. The coefficient for regulatory barriers is -0.155 with a t-value of -5.741 (p = 0.005), indicating that stringent or inefficient regulations hinder the adoption of value addition practices. This suggests that simplifying and streamlining regulations could help facilitate the adoption of value addition practices among smallholder farmers.

Overall, the regression analysis reveals that both positive and negative constraints significantly affect the adoption of value addition practices. Limited access to technology, financing, and infrastructure positively affect the adoption of value addition, while high production costs and regulatory barriers negatively affect it. These findings underscore the need for targeted interventions that improve technology access, financial support, infrastructure, and regulatory frameworks to promote value addition in the agricultural sector of Chongwe District.

Table 8: Multiple Regression Model Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.652[a]	0.426	0.420	0.258	2.118

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
	Regression	18.942	5	3.788	21.568	0.000[b]
	Residual	43.210	261	0.166		
	Total	62.152	266			

Model		*Unstandardized Coefficients*			
		B	*Std. Error*	*T*	*Sig.*
1	(Constant)	2.350	0.105	22.381	0.000
	Limited access to technology	0.265	0.062	4.274	0.001
	Limited access to financing	0.185	0.073	2.537	0.015
	High production costs	-0.312	0.044	-7.091	0.000
	Lack of infrastructure	0.210	0.036	5.833	0.020
	Regulatory barriers	-0.155	0.027	-5.741	0.005

a. Dependent Variable: Value Addition Adoption

b. Predictors: (Constant), Limited Access to technology, Limited Access to financing, High production costs, Lack of infrastructure, Regulatory Barriers

Source: Author's Compilation from SPSS 29, 2024

4.8. Discussion of Findings

The results of this study reveal the significant role that several constraints, such as limited access to technology, financing, high production costs, lack of infrastructure, and regulatory barriers, play in the adoption of value addition practices among small and medium-scale farmers in Chongwe District. These constraints have been widely discussed in the existing literature, highlighting the challenges faced by smallholder farmers globally and in Zambia specifically. For instance, limited access to technology has been shown to hinder value addition processes in rural areas. According to Chisasa (2022), the lack of infrastructure, including processing facilities and road networks, further exacerbates this challenge, as farmers are unable to efficiently process their products and access markets. Similarly, limited access to financing, as noted by Nkhoma et al. (2020), is a persistent barrier in many developing economies, limiting farmers' ability to invest in necessary technologies or scale their operations.

High production costs were identified as a major barrier to value addition in this study, and similar findings have been reported by Akintoye et al. (2020), who argue that high production and transportation costs reduce farmers' profitability

and their willingness to invest in value-added activities. This aligns with the findings in this study, where a significant proportion of respondents indicated that high costs reduce the willingness to invest in value addition. Additionally, regulatory barriers, including inefficient and complex regulatory frameworks, were cited as constraints in both this study and those by Zulu and Chisanga (2022), who emphasize the need for simpler and more supportive regulatory environments to foster value addition in agricultural sectors.

The research objectives and questions are thoroughly addressed through these findings. The study clearly establishes the key constraints of value addition in Chongwe District (Objective 1, Research Question 1), demonstrating that limited access to technology, financing, and infrastructure, along with high production costs and regulatory barriers, significantly hinder value addition efforts. The extent to which these constraints affect farmers (Objective 2, Research Question 2) is illustrated by the regression analysis, which shows the varying degrees of effect that each constraint has on the adoption of value addition practices. Finally, the study identifies and supports interventions to promote value addition (Objective 3, Research Question 3), such as improving access to technology, providing better financing options, and addressing infrastructure challenges, which align with recommendations found in existing literature (Ghimire et al., 2020; Mumba et al., 2022).

5. Conclusion and Recommendations

5.1. Conclusion

Based on the results and findings from Chapter Four of this study, several key observations can be synthesized that contribute to the broader understanding of the constraints to value addition adoption of agricultural products in Chongwe District, Zambia. The study provides substantial contributions to knowledge on how these constraints, including limited access to technology, financing, high production costs, lack of infrastructure, and regulatory barriers, influence the adoption of value addition practices among small and medium-scale farmers. The research findings highlight that these constraints significantly affect farmers' ability to add value to their agricultural products, thus restricting their market opportunities and income growth. Key findings of the study revealed some of the following:

- Limited Access to Technology: The regression analysis showed that limited access to technology positively affects the adoption of value addition practices, indicating the importance of technological intervention for enhancing product quality (coefficient = 0.265).
- Limited Access to Financing: Similarly, access to financing was positively correlated with value addition adoption, reinforcing the critical role of financial support in enabling farmers to invest in value-added practices (coefficient = 0.185).
- High Production Costs: Conversely, high production costs were found to negatively affect value addition, with a significant coefficient of -0.312, highlighting the financial burden that discourages farmers from engaging in value-added agricultural activities.
- Lack of Infrastructure: Lack of infrastructure, particularly in terms of transportation and storage, also positively affects value addition adoption, indicating that improving infrastructure would significantly support farmers in adding value to their products (coefficient = 0.210).
- Regulatory Barriers: Regulatory barriers had a negative effect on value addition, suggesting that inefficient and stringent policies restrict the ability of smallholder farmers to fully engage in value addition (coefficient = -0.155).

5.2. Recommendations

Based on the study's findings and the analysis in Chapter Four, the following recommendations are made to address the key constraints identified and improve value addition among small and medium-scale farmers in Chongwe District:

- Enhance Access to Technology: Implement initiatives to provide small and medium-scale farmers with access to modern processing equipment and technology, such as solar dryers, grinding mills, and packaging machines. Partnerships with agricultural organizations and technology providers can be established to facilitate training and equipment loans.
- Facilitate Access to Financing: Develop microfinance solutions tailored specifically for smallholder farmers, offering low-interest loans or grants to support investments in value addition activities. Access to affordable credit will enable farmers to acquire quality inputs and technology necessary for improving production and value-added processes.
- Strengthen Training and Capacity Building: Collaborate with agricultural extension services and NGOs to design and implement comprehensive training programs. These should focus on value addition techniques, marketing strategies, and the efficient use of available resources. Knowledge and skills enhancement will empower farmers to adopt modern practices and improve product quality.
- Implement Cost-Reduction Strategies: Encourage the formation of cooperative models that allow farmers to share resources and reduce production costs collectively. This could include shared access to processing equipment, bulk purchasing of inputs, and joint marketing efforts, thereby increasing profitability and market competitiveness.
- Improve Infrastructure: Urgently address the infrastructure challenges, such as improving roads, storage facilities, and processing centers, to facilitate easier access to markets and reduce post-harvest losses. Investment in local infrastructure will help farmers reduce costs and improve their competitiveness in the agricultural market.

5.3. Further Research

Based on the findings of this study, the following recommendations for future research are made:

- Exploring the Impact of Technology Adoption on Value Addition Practices: This study found that limited access to technology is a significant constraint on value addition. Future research should investigate the specific technologies that have the greatest effect on smallholder farmers' ability to add value to their agricultural products. Research could focus on examining the long-term impact of different value addition technologies (e.g., solar dryers, grinding mills) on farm profitability, product quality, and market access, particularly in rural areas.
- Investigating the Effect of Infrastructure Development on Value Addition: Infrastructure was identified as a key constraint, particularly poor roads, inadequate storage facilities, and a lack of local processing factories. Future research could focus on evaluating how infrastructure development specifically affects the ability of farmers to add value to their products. Case studies could explore successful infrastructure interventions in other regions and how they could be applied in Chongwe District.

Acknowledgments

I would like to offer my heartfelt gratitude to my supervisor, Dr. Austin Mwange, for his essential guidance, counsel, and support over the course of this dissertation. He profoundly influenced my work during the course of my research and the completion of the final result. I would also like to thank the Director, Management, Staff of the Graduate School of Business (GSB) and Edward Chibwili for providing me with material and moral support throughout my studies. Finally, I would like to express my gratitude to everyone who helped make my studies a success.

Conflict of Interest

The authors declare that they have no conflicting interests

Funding

This research did not receive any specific grant from finding agencies in the public, commercial, or not-for-profit sectors.

Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

References

Akintoye, M., Ojo, O., & Adedeji, A. (2020). Energy constraints and agro-processing in rural Africa: A case study of Nigeria. Energy Policy, 139, 1119-1130.

Asfaw, S., Shiferaw, B., & Simtowe, F. (2015). Smallholder farmers' adoption of improved agricultural technologies in sub-Saharan Africa: A review of the literature. Agricultural Economics, 46(3), 1-17.

Binswanger-Mkhize, H. P., de Regt, J. P., & Spector, S. (2021). Scaling up local and community driven development (LCDD): A real world guide to its theory and practice. World Bank Publications.

Bisht, S. S., Prasad, C., & Aggarwal, A. (2020). Financial support and value addition among smallholder farmers in India. Journal of Agricultural Finance, 15(2), 45-59. https://doi.org/10.1111/agec.12574

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Bryman, A. (2016). Social research methods (5th ed.). Oxford University Press.

Chirwa, E., Nyambura, M., & Muteteke, T. (2021). Processing plants and rural development: Impact on smallholder farmers in Zambia. African Journal of Food Systems, 45(3), 82-97.

Chisasa, J., & Kanu, J. (2021). Effectiveness of market linkages for small-scale farmers in value-added agriculture. African Journal of Agricultural Economics, 9(3), 112-129.

Chisasa, J. (2022). Rural infrastructure and agricultural value chains: The case of Zambia. Journal of African Rural Development, 18(2), 155-170.

Chisanga, B., Kalunga, F., & Moyo, M. (2024). Technological barriers to agricultural growth: A case study in Zambia. Journal of Agricultural Technology and Innovation, 15(2), 112-125.

Clark, H., Smith, L., & Jones, M. (2021). The evolution of value addition in agriculture. International Journal of Agricultural Science, 18(4), 302-317.

Clark, J., Jones, P., & Smith, L. (2021). The evolution of value addition in agriculture: A historical perspective. Cambridge University Press.

Cochran, W. G. (1977). Sampling techniques (3rd ed.). John Wiley & Sons.

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Sage Publications.

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). Sage Publications.

Dube, A., Kewan, A., & Odhiambo, D. (2021). Enhancing the adoption of agricultural technologies: Challenges and opportunities for smallholder farmers in Zambia. Journal of Agricultural Technology, 15(3), 112-128.

Erenstein, O., Haug, R., & Ochieng, J. (2021). The role of technological interventions in value addition among smallholder farmers in Sub-Saharan Africa. African Journal of Agricultural Research, 16(4), 512-528. https://doi.org/10.5897/AJAR2021.15352

Etikan, I., & Bala, K. (2017). Sampling methods in research methodology. Biometrics & Biostatistics International Journal, 5(6), 215-217.

Etwire, P. M., Buah, W. N., & Dery, R. (2013). Financing constraints in agricultural value chains: Evidence from Ghana. Agricultural Economics Review, 44(1), 29-42.

Fafchamps, M., Gubert, F., & Lutz, E. (2021). Barriers to finance and credit in rural Africa: Evidence from smallholder farmers in sub-Saharan Africa. Journal of Development Economics, 148, 42-56.

Field, A. (2013). Discovering statistics using IBM SPSS statistics (4th ed.). Sage Publications.

Food and Agriculture Organization (FAO). (2020). Postharvest losses and value addition in agriculture: Global perspectives. FAO Press.

Ghimire, P., Paudel, S., & Shrestha, S. (2020). Training and capacity building for value addition in agriculture: Implications for smallholder farmers. Agricultural Extension and Rural Development, 23(5), 442-455.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2020). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Sage Publications.

Kabwe, P., Mumba, C., & Kaluba, B. (2022). Government agricultural support programs and value addition among smallholder farmers in Zambia. Zambian Journal of Rural Development, 14(2), 98-112.

Kaluba, A., Mumba, F., & Chingaipe, S. (2021). Land tenure, security, and the challenges of value addition in Zambia's agricultural sector. International Journal of Rural Development, 32(3), 115-130.

Kifayat, A., Khan, M., & Bilal, A. (2021). Postharvest loss and infrastructure constraints in African agriculture: A review of existing barriers. International Journal of Agricultural Economics, 15(4), 79-95.

Kothari, C. R. (2004). Research methodology: Methods and techniques (2nd ed.). New Age International.

Lakshmi, N., & Aparna, S. (2022). Cooperative models in agricultural value addition: A case study from Wisconsin. International Journal of Rural Development, 39(1), 23-41. https://doi.org/10.1080/ijrd.2022.45678

Makori, A., Mutuku, F., & Kamau, M. (2020). Barriers to technology adoption among small-scale farmers in rural Kenya: An empirical analysis. African Journal of Agricultural Research, 18(4), 234-245.

Manyeki, S., Chirwa, E., & Muteteke, T. (2020). Bridging the digital divide in rural Zambia: Opportunities and challenges for smallholder farmers. Zambia Journal of Agricultural Innovation, 22(1), 45-59.

Mufulira, M., Muteteke, T., & Chibwana, M. (2021). The role of cooperatives in enhancing agricultural value addition in Zambia. International Journal of Agricultural Sustainability, 19(2), 104-115.

Mugenda, O. M., & Mugenda, A. G. (2008). Research methods: Quantitative and qualitative approaches. Acts Press.

Mumba, C., Kaluba, B., & Chingaipe, C. (2022). Financial assistance programs for smallholder farmers and value addition in Zambia. Zambian Journal of Economic Development, 20(3), 54-78.

Musonda, R. (2020). The impact of infrastructure on agricultural development in Zambia: A study of agro-processing in rural areas. Zambia Journal of Development Studies, 38(4), 56-73.

Mwesigwa, R., Sebunya, T., & Nsumba, D. (2021). Barriers to value chain development in agriculture: A case study of smallholder farmers in Uganda and Zambia. Agricultural Systems, 78(2), 67-80.

Mwangi, A., Nyambura, M., & Kibet, P. (2022). The role of research and development in agricultural innovation for value addition in Africa. International Journal of Agricultural Economics, 14(2), 112-127.

Nkhoma, K., Shumba, D., & Sinyangwe, G. (2020). Government subsidies and their effect on value addition practices in

Zambia. Zambia Journal of Agricultural Economics, 44(3), 112-124.

Ngugi, M., & Muthui, M. (2020). The impact of financial barriers on the adoption of agricultural innovations in Zambia. African Journal of Finance and Management, 6(3), 21-34.

Ngwira, M., Hikwa, G., & Mutasa, S. (2020). Challenges in market access for value-added agricultural products: A case study of Zambia. International Journal of Agricultural Marketing, 8(2), 29-40.

Nyirenda, C., Chirwa, P., & Banda, J. (2021). Contract farming and value addition among smallholder farmers in Zambia. African Journal of Agricultural Research, 19(4), 210-234.

Pallant, J. (2020). SPSS survival manual: A step-by-step guide to data analysis using IBM SPSS (7th ed.). Routledge.

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press.

Roy, R., Mukherjee, S., & Bhaduri, T. (2019). Value chains and economic outcomes of smallholder farmers in South Asia. Agricultural Economics Review, 25(3), 67-89.

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson Education.

Sekaran, U., & Bougie, R. (2016). Research methods for business: A skill-building approach (7th ed.). Wiley.

Siham, R., & Gumede, B. (2020). Impact of poor road infrastructure on agricultural markets in Southern Africa. International Journal of Rural Development, 32(2), 100-113.

Sunding, D., & Zilberman, D. (2020). Policy interventions and market reforms for value-added agriculture. Journal of Development Economics, 56(2), 134-157.

Taherdoost, H. (2017). Determining sample size; How to calculate survey sample size. International Journal of Economics and Management Systems, 2, 237-239.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International Journal of Medical Education, 2, 53-55. https://doi.org/10.5116/ijme.4dfb.8dfd

United States Department of Agriculture (USDA). (2010). Agricultural value addition: Trends and impacts. https://www.usda.gov/agriculture/valueaddition.pdf

United States Department of Agriculture (USDA). (2010). Value-added agriculture: Enhancing market opportunities. USDA Agricultural Marketing Service.

Yamane, T. (1967). Statistics: An introductory analysis (2nd ed.). Harper & Row.

Zambia Statistics Agency. (2022). Annual Agricultural Report 2022. Lusaka: Government Press.

Zulu, T., & Chisanga, C. (2022). Challenges in accessing value-added agricultural markets among smallholder farmers in Zambia. Zambian Journal of Agribusiness, 10(1), 45-63.