ANALYZING DETERMINANTS OF FARMERS' CHOICE OF COFFEE MARKETING CHANNELS IN BUGISU SUB-REGION :A CASE STUDY OF MBALE DISTRICT, UGANDA

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DECLARATION AND RECOMMENDATION

I BWAYO ISAAC NOEL declare that am the author of this dissertation and that any assistance received in its preparation is fully acknowledged and disclosed in this document. I have also cited sources from which I used; data, ideas or words either quoted directly or paraphrased.

I also certify that this dissertation was prepared by me specifically for the partial fulfillment of the requirement for the award of Degree of Master of Science in Agribusiness Management and Entrepreneurship of Uganda Christian University.

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DEDICATION

I dedicate this dissertation to my family members and friends of development in the agricultural fraternity around the globe.

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May the Almighty God reward them abundantly

ABSTRACT

In Bugisu sub-region, coffee production, particularly Arabica coffee, plays a crucial role in sustaining rural economies, especially in high-altitude areas of Mt. Elgon. Despite the region's favorable agro ecological conditions and its prominence in global coffee markets, smallholder coffee farmers face persistent challenges, including limited access to markets, weak infrastructure, and price instability. These challenges undermine their capacity to derive optimal benefits from coffee farming, prompting the need for research-driven policy interventions to improve marketing efficiency and farmer incomes. This study investigated the determinants influencing smallholder farmers' choice of coffee marketing channels in Mbale District, Uganda. It aimed to (i) assess the influence of socio-demographic characteristics, (ii) examine the role of institutional factors, and (iii) analyze farm-level characteristics that shape farmers' marketing channel decisions. A structured survey and quantitative analysis approach were employed, with multinomial logistic regression used to estimate the likelihood of farmers choosing among three marketing channels: cooperatives (reference category), private traders, and exporters. The results show that socio-demographic variables such as; education, age, household income, farming experience, off-farm income, and primary occupation significantly affect marketing channel choices. For instance, education level significantly increased the likelihood of marketing through private traders ($p = .004$) and exporters ($p = .002$), while farming experience influenced both options ($p = .002$ and $p = .034$, respectively). Household income and age were particularly significant in the exporter category. Institutional factors also emerged as strong predictors. Access to credit significantly increased the probability of using private traders ($p = .023$) and exporters ($p = .012$). Access to extension services ($p = .024$), market information ($p = .002$), and market proximity were also significant determinants. Cooperative membership, notably, influenced the likelihood of switching to other marketing channels. At the farm level, descriptive analysis indicated that 35.94% of farmers sold to exporters, 33.07% to cooperatives, and 30.99% to private traders. Regression results showed that; farm size, yield, location, investment level, and use of production technology were all statistically significant in determining channel choice, especially favouring exporters and cooperatives over private traders. The study concludes that the choice of coffee marketing channels among smallholder farmers is shaped by an intricate interplay of socio-demographic, institutional, and farm-level factors. These insights underscore the importance of strengthening institutional support—particularly access to credit, extension services, and market information—and promoting cooperative membership and exporter linkages for better-resourced and technically advanced farmers. Policy interventions targeting these areas can enhance equitable access to high-value markets and improve the livelihoods of coffee-dependent communities in Uganda and across East Africa.

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ABBREVIATIONS AND ACRONYMS

BCU:	Bugisu Cooperative Union
GoU :	Government of Uganda
ICO :	International Coffee Organization
MAAIF:	Ministry of Agriculture, Animal Industry and Fisheries
MDA:	Ministry and Development Agencies
MNL:	Multinomial Logistic
MoFPED:	Ministry of Finance Planning and Economic Development
NAADS:	National Agricultural Advisory Services
NAP:	National Planning Authority.
NGOs:	Non-governmental Organizations.
TPB:	Theory of Planned Behavior
UBoS:	Uganda Bureau of Statistics
UCDA:	Uganda Coffee Development Authority
UCU:	Uganda Christian University
UNDP:	United Nations Development Program

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Over the last four decades, coffee has emerged as the most valuable and widely traded tropical agricultural commodity globally, with Arabica and Robusta as the two main commercial varieties (UNDP, 2013; Nkechi & Uchenna, 2015). In East Africa, coffee production is a central pillar of rural economies, especially in Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. Arabica coffee, grown in high-altitude areas, dominates production in Ethiopia and parts of Kenya and Uganda. The region's diverse agroecological zones provide ideal conditions for premium-quality Arabica coffee, making it a key player in the global coffee market (ICO, 2023). However, smallholder farmers—who form the backbone of the coffee industry—often face challenges related to limited market access, poor infrastructure, and price volatility, pushing policymakers and researchers to seek sustainable solutions to improve marketing efficiency and producer incomes (Jena et al., 2017).

Uganda is Africa's second-largest coffee producer after Ethiopia and remains one of the few countries that produce both Arabica and Robusta coffee varieties. Arabica is typically grown in the highland areas of eastern and western Uganda, particularly in the Elgon region (UBOS, 2022). The government, through the Uganda Coffee Development Authority (UCDA), has committed to increasing coffee production to 20 million 60-kg bags annually by 2030, as outlined in the Coffee Roadmap (UCDA, 2020). Despite liberalization and a shift from cooperative-led to private-sector-driven marketing, smallholder farmers continue to experience low farm-gate prices, limited access to quality extension services, and high transaction costs (Mugoya & Mawejje, 2021). As such, understanding the coffee marketing landscape is critical for policy formulation aimed at enhancing farmer welfare and sector competitiveness.

Within Uganda, the Bugisu sub-region, comprising districts such as Mbale, Manafwa, Bududa, and Sironko, has long been regarded as a premium Arabica coffee-producing area due to its fertile volcanic soils and favourable altitude along Mount Elgon. The Bugisu Arabica coffee, often marketed as "Bugisu AA," is internationally recognized

for its unique flavour and high cupping scores (UCDA, 2023). The region's coffee economy thrived under the Bugisu Cooperative Union (BCU), which played a significant role in offering extension support, credit facilities, and competitive pricing mechanisms. However, the decline of cooperative dominance following structural adjustment reforms introduced market liberalization, leading to the fragmentation of marketing channels and growing influence of private traders and middlemen (Baffes, 2006). This shift significantly altered farmers' access to reliable and profitable markets.

In Mbale District, the heart of the Bugisu sub-region, coffee remains a primary income source for thousands of smallholder farmers. While the liberalized market has introduced competition and improved market access, it has also exposed farmers to exploitative pricing, unreliable buyers, and inconsistent quality control standards (Tumwebaze et al., 2022). Farmers now navigate a complex web of marketing options including traditional cooperatives, independent exporters, processor networks, and local middlemen. The choice of marketing channel is influenced by several factors, including proximity to buyers, price offered, access to transportation, trust in the buyer, and availability of extension services. Yet, empirical studies on how these factors shape farmers' marketing decisions in Mbale remain limited.

Given coffee's vital role in Uganda's socio-economic development and Bugisu's historical importance in Arabica coffee production, understanding the dynamics of marketing channels in Mbale District is crucial. The sustainability of the coffee sector depends not only on increasing production but also on enhancing farmers' capacity to market their produce through channels that maximize their incomes.

1.2 Statement of Problem

Despite the liberalization of Uganda's coffee sector in the early 1990s, which aimed to increase efficiency, competition, and farmer incomes, smallholder coffee farmers in the Bugisu sub-region, particularly Mbale District, continue to experience income volatility and persistently low returns (Baffes, 2006; UBOS, 2021). The introduction of multiple marketing channels, including cooperatives, private traders, and export companies, was expected to empower farmers with greater market access and price flexibility. However, the outcomes of liberalization have been uneven.

While some farmers have benefited from selling to private traders who offer immediate cash and higher farmgate prices, others remain committed to cooperatives due to perceived stability, access to credit, extension services, and group-based bargaining power (Nakajubi et al., 2020; ICO, 2019). This duality presents a paradox in the market: although farmers now have greater freedom in choosing whom to sell to, their choices do not always translate into improved welfare.

The critical challenge lies in the limited empirical understanding of the determinants that influence smallholder farmers' selection of specific marketing channels in the current liberalized context. Factors such as household socio-economic characteristics, access to institutional support, market information, and farm-level attributes are likely to play significant roles, yet remain under-researched in this region. Without a data-driven understanding of these dynamics, ongoing policy interventions, cooperative reforms, and private sector engagement risk being misaligned with the real preferences, behaviours, and constraints of farmers.

Therefore, this study seeks to fill this gap by analysing the socio-economic, institutional, and farm-level factors that influence farmers' decisions in selecting coffee marketing channels in Mbale District. The findings are expected to inform targeted interventions that enhance market efficiency and improve farmer welfare within the coffee value chain.

1.3 Research Objectives

1.3.1 General Objective

To assess the socio-economic, institutional, and farm-level factors influencing the choice of coffee marketing channels among smallholder farmers in Mbale District, Uganda.

1.3.2 Specific Objectives

1. To determine the relationship between farmers' socio-economic characteristics and their choice of coffee marketing channels in Mbale District.
2. To assess the influence of institutional factors on farmers' choice of coffee marketing channels in Mbale District.
3. To evaluate the effect of farm-level characteristics on the selection of marketing channels in Mbale District.

1.4 Research Questions

1. How do socio-economic characteristics affect smallholder farmers' choice of coffee marketing channels in Mbale District?
2. To what extent do institutional factors influence marketing channel selection among coffee farmers in Mbale District?
3. What is the relationship between farm-level characteristics and the farmers' choice of coffee marketing channels in Mbale District?

1.5 Justification of the Study

Mbale District, located in the Bugisu sub-region of Eastern Uganda, was one of the country's most prominent Arabica coffee-producing areas. Coffee farming in this region had been deeply rooted in the socio-cultural and economic fabric of the community, with the crop providing income, employment, and food security for a significant proportion of smallholder households. Despite the strategic importance of coffee to the livelihoods in Mbale, farmers faced challenges in accessing reliable and profitable marketing outlets. The liberalization of the coffee sector had introduced multiple marketing channels, yet farmers' incomes remained inconsistent, often due to poor bargaining power, lack of market information, and

limited access to institutional support (UCDA, 2023). These challenges were particularly evident in remote areas of Mbale, where infrastructure and service delivery remained weak.

Over the years, coffee cooperatives in Mbale had experienced a decline in farmer participation, while private traders had become more active, offering ready cash and doorstep services. However, this shift raised questions about the sustainability and fairness of the market relationships between farmers and these informal traders. Some farmers expressed dissatisfaction with low prices and exploitative practices, yet others continued to prefer them over cooperatives due to the immediate benefits offered. The diversity in marketing behaviors within a geographically concentrated area like Mbale suggested that farmers were influenced by a complex set of socio-economic, institutional, and farm-level factors. Understanding these factors through quantitative analysis was essential to designing context-specific interventions that could enhance farmers' marketing decisions and welfare.

The study was particularly relevant to Mbale District as it aimed to provide empirical evidence to guide stakeholders, including district agricultural officers, cooperative leaders, and development partners, in strengthening coffee marketing systems in the region. By identifying which factors significantly affected marketing channel choices, the study helped improve extension services, revitalized cooperatives, and informed the development of inclusive market policies tailored to the realities of smallholder coffee producers in Mbale. Ultimately, the research supported ongoing district and national efforts aimed at increasing household incomes and reducing rural poverty through agricultural commercialization (MAAIF, 2021).

1.6 Scope and Limitation of the Study

This study was conducted to analyse the socio-economic, institutional, and farm-level factors that influenced the choice of coffee marketing channels among smallholder Arabica coffee farmers in Mbale District, located in the Bugisu sub-region of Eastern Uganda. The focus was placed on farmers engaged in Arabica coffee production, the predominant variety grown in the highland areas of the district due to its favourable agro-ecological conditions (UCDA, 2023). The research investigated farmers' preferences for various marketing channels—including

cooperatives, private traders, and processors—and examined the determinants shaping their decisions during the 2024–2025 coffee marketing season. A quantitative research approach was employed, using structured questionnaires to collect data from a representative sample of farmers across selected sub-counties.

The study was limited to Mbale District, and although it provided regionally relevant insights, its findings may not be fully generalizable to other coffee-growing areas of Uganda, especially regions producing Robusta coffee or operating under different institutional and market structures. The cultural context of Bugisu, where coffee cooperatives have a historical and social legacy, likely shaped farmers' behaviour in unique ways. Additionally, the reliance on self-reported data from farmers posed a limitation, as responses related to yields, prices, and income may have been influenced by recall bias or subjective estimation. While care was taken in designing the questionnaire to enhance clarity and accuracy, the lack of corroborative records constrained the ability to fully verify the data.

Furthermore, although the study addressed key formal and informal marketing channels accessible to smallholder farmers, it did not deeply investigate newer or emerging platforms such as digital marketplaces, online cooperatives, or export contract schemes. These marketing innovations were either in early stages or largely inaccessible to most smallholder Arabica farmers in Mbale at the time of the study. Nevertheless, by focusing on the dominant traditional channels, the study offered valuable insights into the real-world market choices and constraints faced by rural coffee producers in the region. The findings are expected to inform local policymakers, cooperative managers, and development practitioners on how to improve market access and income sustainability for coffee farmers in Mbale District.

1.7 Operational definition of terms

1.7.1. Coffee Marketing Channels

Coffee marketing channels are the different pathways through which coffee farmers sell their coffee, including cooperatives, private traders, and exporters.

1.7.2. Farmers' Choice

Farmers' choice refers to the decision-making process by which coffee farmers select a specific marketing channel based on factors like price, reliability, and access.

1.7.3. Socio-Economic Factors

Socio-economic factors are the demographic and economic characteristics, such as age, education, and income, that influence farmers' decisions in selecting a marketing channel.

1.7.4. Institutional Factors

Institutional factors are the external support systems, such as access to credit, extension services, and market information, that influence farmers' marketing choices.

1.7.5. Farm-Level Characteristics

Farm-level characteristics refer to the physical attributes of a farm, such as size, coffee yield, and production techniques, that impact marketing channel selection.

CHAPTER TWO

LITERATURE REVIEW

2.1 Arabic Coffee Production in Uganda

The Arabica coffee sector in Uganda plays a critical role in the livelihoods of smallholder farmers. Studies show that production is concentrated in highland areas, particularly in the Mount Elgon region, where altitude and climate are optimal for Arabica cultivation. However, the sector faces significant challenges such as aging coffee trees, limited access to quality inputs, and inadequate extension services. These factors hinder productivity and quality, making it difficult for farmers to compete in the global market (MoFPED, 2022; MAAIF, 2020; Ouma et al., 2009).

Coffee production in Uganda is heavily influenced by climatic factors, with temperature and rainfall variability affecting yield stability. Research indicates that climate change exacerbates these challenges, leading to an increased need for adaptive strategies, such as the adoption of climate-smart agricultural practices. One significant adaptation is the integration of diversified cropping systems that include shade trees, which help maintain optimal growing conditions for Arabica coffee. This practice has been linked to enhanced coffee resilience against pests and diseases while also providing income diversification (Liebig, 2017).

Intercropping Arabica coffee with other crops, particularly bananas, is another common practice in Uganda. This practice offers both economic and ecological benefits, such as improved soil fertility, reduced erosion, and higher overall farm productivity. However, it also presents challenges, including resource competition between the crops and difficulty in managing both systems effectively. Despite these challenges, intercropping remains a viable strategy for enhancing both food and cash crop production on smallholder farms (UBoS, 2024; Ouma et al., 2009).

The coffee sector in Uganda also faces pest and disease management challenges, with the most significant threats being coffee berry disease and leaf rust. Effective pest and disease control is essential for maintaining productivity and quality. Studies suggest that pest management strategies, such as improving shade management and integrating organic practices, can reduce the prevalence of these threats. The implementation of these strategies is further supported by government and NGO

initiatives to strengthen farmers' knowledge and technical capacity (MAAIF, 2020; Ouma et al., 2009).

2.2 Socio-economic factors

In Sub-Saharan Africa, coffee production is a major agricultural activity, providing livelihoods for millions of smallholder farmers. The socio-economic characteristics of these farmers directly influence both coffee production practices and the marketing channels they use. In regions like Uganda, where coffee is a key export crop, factors such as age, education, household size, gender, access to land, and social networks play a crucial role in shaping farmers' decisions related to coffee cultivation, its productivity, and market interactions. Coffee farmers in Uganda, particularly those in areas like Mbale District, face unique challenges that require an understanding of how socio-economic factors affect not only farm-level productivity but also the marketing strategies used to reach domestic and international markets.

Age is a factor that influences both production and marketing practices in coffee farming. Older farmers in Uganda often have more experience and may be more inclined to use traditional farming methods, leading to lower productivity compared to younger farmers who may be more receptive to new technologies such as improved coffee varieties or sustainable farming techniques (Doss, 2023). However, younger farmers might lack the capital to invest in modern farming inputs or may find it more difficult to access reliable market channels, especially in remote areas (World Bank, 2016). Similarly, education plays a significant role in both production and marketing. Educated farmers are better equipped to understand market trends and can make more informed decisions about the best marketing channels to use for selling their coffee. However, in regions like Kibuku, where literacy rates are lower, farmers may struggle to access market information, leading to lower prices or missed opportunities in the coffee trade (Asfaw et al., 2022).

Gender dynamics also affect both production and marketing channels in Uganda's coffee sector. Women often face significant barriers in accessing land and capital for farming, which limits their ability to scale up coffee production (Quisumbing et al., 2014). This gender disparity can also be seen in marketing, where women may have less bargaining power in coffee trading, leading to lower returns from the

coffee sales. Similarly, household size impacts both production capacity and market access. Larger households may have more labour available for farm activities, increasing the amount of coffee produced. However, larger families also face higher consumption demands, which might limit the quantity of coffee available for sale and reduce the amount of coffee farmers can send to higher-paying export markets (Kassie et al., 2014).

Access to land is critical in determining the scale of coffee production. In Uganda, where land tenure systems often favour male farmers, women and youth may face restrictions in accessing land, which limits their ability to produce coffee on a large scale (Agarwal, 2023). This barrier impacts not only the quantity of coffee produced but also the ability to participate in higher-value coffee markets. Similarly, access to credit is a limiting factor for smallholder coffee farmers, who often struggle to access financial services that could help them purchase inputs like fertilizers, improved seedlings, and irrigation systems. This limits their ability to improve production, which in turn restricts their access to more profitable coffee marketing channels (Diagne et al., 2020). Income levels also play a major role in farmers' ability to invest in coffee farming. Low-income farmers may rely on middlemen or local buyers, receiving lower prices for their coffee compared to those who have the resources to access direct export markets or specialty coffee buyers (Gollin et al., 2010).

Finally, social networks have become increasingly important in coffee production and marketing in Uganda. Farmers who are well-connected within their communities or through cooperative organizations often have better access to information about coffee market prices and trends (Uphoff et al., 2021). These networks can also provide farmers with collective bargaining power when negotiating prices with buyers. In regions like Kibuku, where smallholder farmers may lack direct access to larger markets, cooperative-based marketing channels have become a popular strategy for improving both coffee prices and market access.

2.3 Institutional factors

In Sub-Saharan Africa, particularly in Uganda and regions like Mable District, smallholder coffee farmers face a range of institutional factors that significantly impact their productivity and access to markets. One key factor is the role of cooperatives and farmer organizations. These institutions provide a platform for smallholders to pool their resources, share knowledge, and increase their bargaining power when negotiating with buyers. However, the effectiveness of these cooperatives is often limited by poor management, lack of technical capacity, and undercapitalization, which hinder their ability to secure fair prices for coffee farmers. In Uganda, while farmer organizations are numerous, many struggle with sustainability and fail to meet the needs of their members, which restricts smallholder farmers from fully benefiting from the collective power of these institutions (Bazaara & Kiryabwire, 2019).

Another critical factor is the availability and quality of extension services. In Uganda, agricultural extension services are often underfunded and poorly resourced, leading to a gap in providing smallholder coffee farmers with the necessary technical support. Extension workers are typically overburdened, and their training in the latest farming techniques, pest management, and post-harvest processing may not be up to date. This lack of effective extension support means that smallholder coffee farmers may not be able to adopt best practices for improving coffee quality, which affects their competitiveness in international markets. This is especially relevant for coffee varieties such as Arabic coffee, which requires more intensive management and knowledge to thrive, particularly in the face of climate change (Mogues et al., 2016).

Market access and pricing mechanisms are also crucial institutional factors. In Mable District, smallholder coffee farmers often face challenges in accessing lucrative markets due to poor infrastructure, especially in remote areas. Roads are often in poor condition, making it difficult for farmers to transport their coffee to central markets where better prices are available. Additionally, farmers frequently sell their coffee to middlemen or local buyers who offer low prices, often taking advantage of the farmers' lack of market knowledge and limited access to larger buyers. The lack of direct access to international coffee markets means that these farmers miss out on potential premium prices that could be earned through certification programs

or direct sales to roasters, particularly those interested in high-quality Arabic coffee (Sserunkuuma & Okello, 2014).

Finally, government policies and regulations significantly affect smallholder coffee farmers in Uganda. Inconsistent and poorly enforced policies often discourage long-term investment in the coffee sector. For example, policies on land tenure, access to credit, and support for climate-smart agriculture practices can either enable or hinder farmers' ability to improve their productivity. In Mable District, land fragmentation and insecure land tenure pose major challenges, as many farmers do not have guaranteed ownership of the land they farm on. This uncertainty undermines the incentive to invest in long-term improvements or sustainable farming practices, particularly for high-value crops like Arabic coffee, which requires long-term commitment to its care and harvesting. Furthermore, the lack of a stable credit system leaves many farmers unable to purchase the necessary inputs, such as fertilizers and high-quality seeds, to enhance their coffee yields and compete on international markets (Kato & Mwesigye, 2015).

2.4 Farm level characteristics

The relationship between farm-level characteristics and coffee production and marketing in Sub-Saharan Africa, particularly in Uganda and Mbale District, is deeply interconnected with the socio-economic and environmental factors at play. In Uganda, characteristics such as land tenure security, access to extension services, and financial resources significantly influence both the productivity of coffee farms and the channels through which coffee is marketed. Research by Asiimwe (2023) highlights how the increasing role of women in coffee production has not only improved productivity but also enhanced market access for smallholder farmers, signalling that gender dynamics are essential in shaping agricultural outcomes. Smallholder farmers in Mbale District, for example, are increasingly adopting improved practices due to the support provided by both government and non-governmental organizations (NGOs), thereby influencing their farm-level production decisions and the marketing of their produce. Additionally, land tenure security plays a critical role in motivating farmers to invest in long-term improvements to their coffee farms, as it guarantees their control over the land for the foreseeable future.

In Mbale District, the practice of coffee-banana intercropping is one of the agronomic strategies employed by farmers to address both productivity and sustainability. This practice allows farmers to diversify their income streams, which reduces their reliance on coffee alone and helps to buffer against price fluctuations and market instability. According to Wairegi et al. (2010), coffee-banana intercropping not only enhances farm-level productivity but also helps to improve soil fertility, making it an environmentally sustainable practice. Moreover, intercropping has been shown to increase coffee yields and quality, which directly impacts the marketability of coffee in Uganda. By diversifying their agricultural outputs, farmers in Mbale are not only securing better harvests but also optimizing their market access, as better-quality coffee has a higher likelihood of attracting premium market prices. This diversification also improves resilience against climate-related stresses, which is particularly crucial in regions prone to environmental uncertainty.

Climate change has emerged as a significant challenge for coffee production in Uganda, with shifting weather patterns and increasing temperatures reducing overall yields and threatening coffee farmers' livelihoods. Adaptation strategies, such as the adoption of climate-smart agricultural practices, have been identified as essential in mitigating these challenges. These practices include planting drought-resistant coffee varieties, using mulching to conserve soil moisture, and applying organic fertilizers to improve soil structure (Tenywa et al., 2014). The adoption of these climate-smart practices directly influences not only the sustainability of coffee production but also the quality and quantity of coffee that farmers are able to produce. This, in turn, impacts the market dynamics, as coffee buyers often favour higher-quality coffee. As climate change becomes an increasing concern, farmers in Mbale and other regions of Uganda are being encouraged to adopt these adaptive practices, which provide long-term solutions for maintaining coffee production and improving its marketability in a changing environment.

Gender dynamics within coffee production systems are critical for understanding the production and marketing channels in Uganda. Despite the significant involvement of women in coffee cultivation, gender inequality persists, particularly when it comes to access to markets and control over the income generated from coffee sales. Studies have shown that women, especially in rural Uganda, are heavily

involved in labour-intensive activities, such as planting, weeding, and harvesting coffee, but often lack access to marketing channels or control over financial resources (Tusasiirwe, 2022). Addressing these gender gaps is essential for improving both the productivity and profitability of coffee farming, as enabling women to fully participate in coffee marketing can lead to better income generation and greater household welfare. Ensuring that women have equal access to resources, extension services, and training in market engagement is a crucial step in enhancing the overall effectiveness of Uganda's coffee industry. Gender-inclusive policies and programs that empower women to take on leadership roles in coffee marketing are essential for the long-term sustainability of the sector.

2.5 Determinants of coffee marketing channels

The determinants of coffee marketing channels in Sub-Saharan Africa, including Uganda and Mbale District, have been widely studied, reflecting the importance of this cash crop in the region's agricultural economy. Various studies have identified a range of factors influencing coffee marketing, from farm-level characteristics such as production capacity, farm size, and access to extension services, to external factors such as market infrastructure, price volatility, and the role of cooperatives. According to studies by Asimwe, 2023; Wairegi et al. (2010), the choice of marketing channels in Uganda is highly influenced by the availability and accessibility of market infrastructure, including roads, transportation, and storage facilities. Additionally, farmers in Mbale District often rely on intermediaries to reach larger markets, indicating a significant gap in direct market access for smallholder farmers. However, despite the recognized importance of these factors, much of the literature fails to deeply explore the interactions between these determinants and how they collectively shape coffee marketing decisions at the household level.

Several studies highlight that smallholder coffee farmers in Uganda often face challenges related to price fluctuations, lack of market information, and limited bargaining power. For instance, Asimwe (2023) identifies that the absence of effective price-setting mechanisms in the local coffee markets often forces farmers to sell at unfavourable prices. Additionally, the reliance on middlemen (or "agents") to sell coffee not only reduces the farmers' income but also limits their access to higher-value markets. The lack of transparency and efficient price discovery mechanisms in Uganda's coffee sector contributes to poor decision-making in

selecting marketing channels, ultimately leading to suboptimal income for smallholder farmers. Furthermore, a significant body of literature has focused on the role of cooperatives in linking smallholder farmers to formal markets, yet few studies have critically examined the effectiveness of these cooperatives in empowering farmers and enhancing their bargaining power within the value chain. Cooperatives are often touted as a key solution to marketing challenges in Uganda, but research on the operational barriers, leadership, and member satisfaction within these groups remains sparse.

In Mbale District specifically, a key determinant influencing coffee marketing channels is the degree of farmer involvement in both production and market decision-making. The shift from traditional coffee marketing to a more diversified approach, involving both domestic and international markets, has been driven by the increasing awareness of fair-trade practices and the role of quality in determining price premiums (Tenywa et al., 2014). In this context, Mbale farmers have engaged in certification schemes such as organic coffee certification and Fair-Trade certification. However, despite the success stories, these schemes have often been criticized for not fully addressing the capacity-building needs of local farmers and for the high costs of certification, which can limit participation. Research by Okalany (2022) suggests that while these certifications can increase farmers' incomes, they often overlook smallholder farmers' struggles with meeting the rigorous production standards and the lack of market readiness to absorb certified coffee from the region. This gap highlights a need for further investigation into the economic feasibility and practical challenges faced by farmers when adopting these marketing schemes in Mbale District.

Additionally, climate change and its impact on coffee production are emerging as significant determinants of marketing channels. The volatility in climate conditions has affected coffee yields and quality, which directly influences the choices of marketing channels available to farmers. According to Tenywa et al. (2014), extreme weather events have led to lower and unpredictable coffee harvests, making it difficult for farmers to establish long-term marketing relationships with buyers. Farmers in Mbale, therefore, often choose to sell to local traders and intermediaries rather than attempting to enter international markets where more stringent quality standards exist. However, limited studies have focused on how climate variability

interacts with market structures and how farmers adapt their marketing strategies in response. A further gap exists in understanding how climate adaptation strategies could be incorporated into market channel selection processes and how this could, in turn, improve farmers' market power and resilience in Mbale and the broader region.

Research gap; while existing literature provides valuable insights into individual determinants of coffee marketing channels in Sub-Saharan Africa, Uganda, and Mbale District, there remains a significant gap in understanding the cumulative impact of these determinants. Specifically, there is insufficient research on how farm-level characteristics, market infrastructure, price fluctuations, and climate change interact to influence marketing decisions in a holistic manner. Additionally, the role of cooperatives in bridging market access gaps needs further exploration, particularly regarding their operational efficiency, leadership structures, and the tangible benefits to smallholder farmers. Finally, more studies are needed on how certification schemes, while potentially beneficial, pose challenges for smallholders in terms of access, costs, and practical implementation. Addressing these gaps will provide a more comprehensive understanding of the coffee marketing dynamics and inform policies that could enhance farmers' market access and income.

2.6 Theoretical and Conceptual Framework

2.6.1 Theoretical Framework

The Theory of Planned Behaviour (TPB) is a widely used framework in agricultural economics for understanding decision-making processes and behaviour, particularly in contexts where individual actions are influenced by personal, social, and environmental factors. TPB has been utilized in various studies to explain how factors such as attitudes, subjective norms, and perceived behavioural control influence the choices of farmers in adopting agricultural practices, selecting markets, or engaging in specific agricultural activities (Ajzen, 1991).

In the context of coffee marketing channels, TPB is an appropriate theory because it helps explain how farmers’ choices of marketing channels (cooperatives, private traders, exporters) are shaped by their perceptions of the benefits and challenges associated with each channel, as well as by socio-economic and institutional factors. The attitudes of farmers towards each marketing channel (e.g., preference for

higher prices or better payment terms) can directly influence their decision-making. Subjective norms, such as peer pressure or community norms, may influence farmers' choice of marketing channels, particularly in collective agricultural settings like cooperatives. Finally, perceived behavioural control addresses the factors that affect farmers' ability to choose or access a particular marketing channel, such as access to market information, infrastructure, and credit (Ajzen, 1991; Pender, 1996).

The TPB is particularly relevant for this study because it accounts for both internal factors (attitudes, preferences) and external factors (institutional support, market access) that shape farmers' decisions. Moreover, it allows for a deeper exploration of how socio-economic factors and institutional factors influence farmers' decision-making and how these factors may mediate the adoption of various marketing channels.

2.6.2 Conceptual Framework

The conceptual framework in this study was built upon the understanding that farmers' marketing channel choices as influenced by both individual-level characteristics (such as socio-economic factors, farm-level characteristics) and institutional-level characteristics (such as access to information, credit, and extension services). Therefore, the study drew from previous works that utilized the Theory of Planned Behaviour in agricultural marketing decisions, such as those by Pender (1996) and Bersales et al. (2017), who demonstrated that farmers' choices of marketing channels were strongly influenced by a combination of personal beliefs, peer influence, and institutional support.

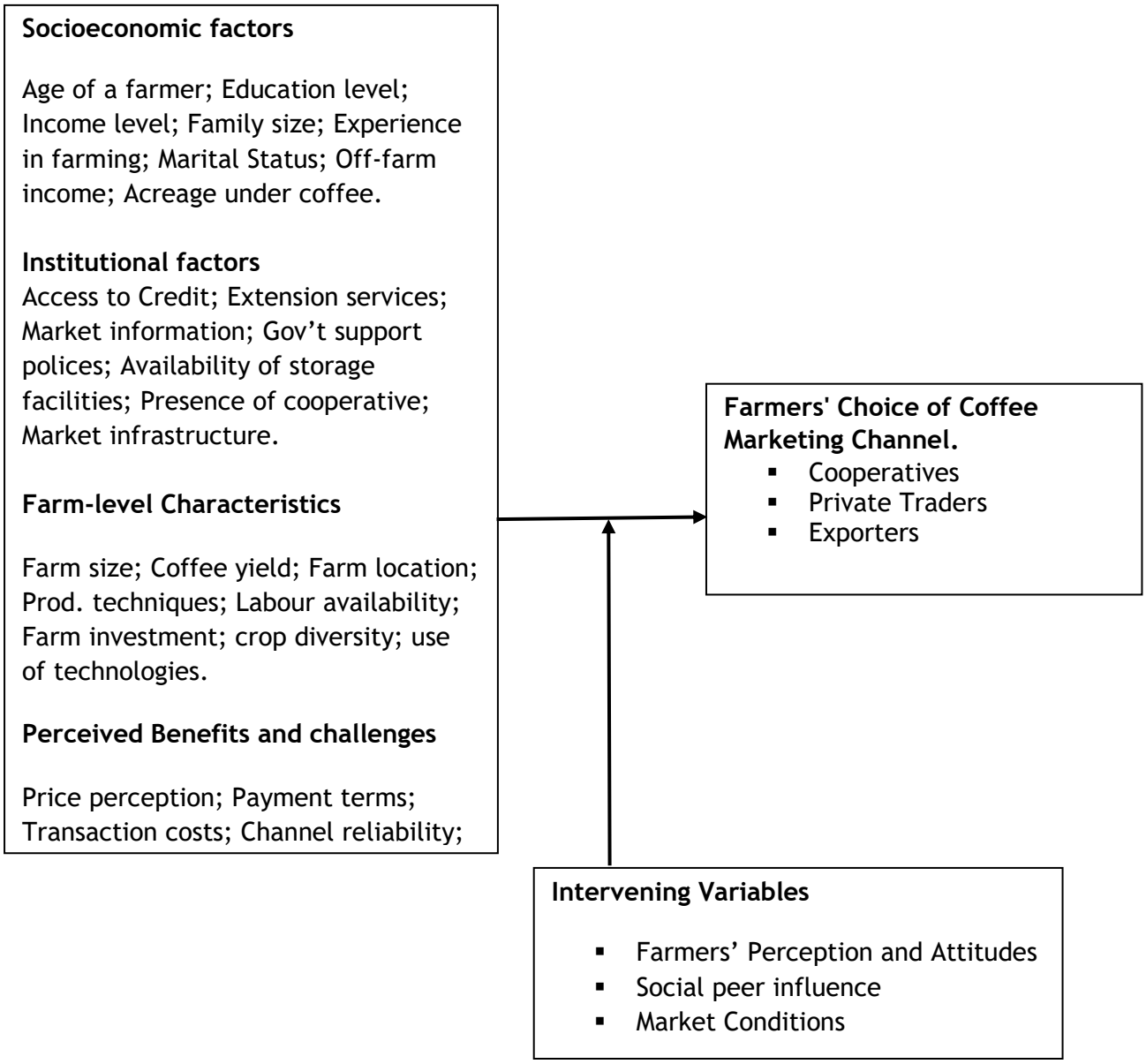

Figure 1: Conceptual Framework

Source: Own Conceptualisation

CHAPTER THREE

METHODOLOGY

3.1 Study Area

Mbale District, located in the Eastern region of Uganda, serves as a key administrative and commercial center within the region. Geographically, the district is positioned between latitudes 00°57' North and longitudes 34°20' East, with a total land area of approximately 518.8 square kilometres. Mbale District is bordered by the districts of Sironko to the north, Bududa to the northeast, Manafwa to the southeast, Tororo to the south, Butaleja to the southwest, and Budaka to the west. This geographic positioning enhances its connectivity, facilitating trade and the exchange of goods and services across its borders (Mbale District Local Government 2019).

The district's topography and climate are critical factors influencing its agricultural activities. Mbale lies at the foot of Mount Elgon, an extinct volcano that rises to over 4,000 meters above sea level. This mountain range provides a fertile environment for the cultivation of crops, particularly Arabica coffee, which thrives in the high-altitude regions of the district. The climatic conditions, characterized by a tropical climate with seasonal rainfall patterns, further support the growth of key crops such as bananas, maize, potatoes, and beans. The region's fertile volcanic soils are crucial in sustaining its agricultural base, which is essential for the livelihoods of most of the district's population (Mbale District Local Government, 2019).

The district's population, estimated at 441,300 people in 2012, is projected to grow significantly, with a population forecast of 586,300 by 2024. Economically, Mbale District is heavily reliant on agriculture, with coffee being one of the key cash crops grown in the region. Arabica coffee from the district is highly valued, particularly from the fertile slopes of Mount Elgon, known for its distinct flavor profile that attracts both local and international markets. Besides coffee, other major crops include matooke (bananas), maize, beans, potatoes, carrots, and sweet potatoes, which form the backbone of subsistence farming. Despite these strengths, the district faces challenges such as limited infrastructure, inadequate access to markets, and fluctuating commodity prices, which hinder the growth of its economy. Nevertheless, ongoing efforts to improve these areas, alongside the expansion of

commercial agriculture and tourism, are expected to enhance Mbale's economic resilience (UBoS, 2024; Development Policy and Performance Portal, 2020/21). Figure 2, represents the map of the study area.

Figure 2: Map of Mbale District

Source: Google Map

3.2 Sampling Procedure

The study employed a multi-stage sampling procedure to select respondents from Mbale District. Initially, Mbale District was purposively selected due to its prominence as a major coffee-producing area in the Bugisu sub-region. In the second stage, all sub-counties within the district were purposively selected, given their significant role in coffee cultivation, particularly Arabica coffee, which thrives in

the fertile volcanic soils of the region. Subsequently, three parishes were randomly selected from each of the chosen sub-counties, ensuring diverse representation from different coffee-growing zones.

Finally, simple random sampling was used to select smallholder farmers from the identified parishes. A comprehensive list of farmers was compiled with the assistance of agricultural extension officers in each sub-county, serving as the sampling frame from which respondents were drawn. The sample size was proportionately allocated to smallholder farmers engaged in Arabica coffee cultivation, based on the number of coffee farmers in each selected parish, with guidance from the agricultural extension officers in the area. This approach ensured a representative sample that captures the diversity of coffee farming practices across Mbale District.

3.3 Sample Size Determination

The required sample size for the study was determined using the sample size formula outlined by Cochran (1977), which was given as:

$$n = \frac{Z^2 .P .Q}{E^2} \quad \text{..... (1)}$$

Where;

n = Sample size

Z = Confidence level (for a 95% confidence level, α=0.05\alpha = 0.05α=0.05, so, Z=1.96Z = 1.96Z=1.96)

p = Proportion of the population with the key characteristics (since this was unknown for coffee farmers in Mbale District, p=0.5p = 0.5p=0.5)

q=1−pq = 1 - pq=1−p

E = Allowable error (set at 0.05)

Therefore, substituting the values into the formula resulted in a sample size of approximately 384 respondents. This sample size was deemed adequate to represent the population of coffee smallholder farmers in Mbale District, ensuring the findings were statistically significant and reliable for generalization within the study area.

3.4 Data Collection and Analysis

This study utilized both primary and secondary data sources. Primary data was collected through face-to-face interviews with coffee smallholder farmers in Mbale District, using semi-structured questionnaires designed to capture comprehensive information about their coffee farming practices, challenges, and the use of agricultural inputs. The questionnaires were administered by trained enumerators who were familiar with the local context and the coffee farming practices in Mbale District. Secondary data was sourced from government reports, agricultural extension publications, and academic journals, focusing on coffee production and pesticide use in Uganda.

The collected data was coded and entered into statistical software, specifically STATA (version 15), for detailed analysis. Descriptive and inferential statistics were used to examine patterns in coffee farming practices, while econometric regression analysis was employed to understand the relationship between key variables such as socioeconomic, institutional, farm-level characteristics and coffee marketing channels among smallholder coffee farmers in Mbale District.

3.4.1 Analytical Frameworks

Objective one: To determine the relationship between farmers' socio-economic characteristics and their choice of coffee marketing channels in Mbale District.

Table 1: Selected Variables to address objective one

Independent Variables	Dependent Variable
1. Age of the farmer 2. Gender of the farmer 3. Education level 4. Household income level 5. Farming experience (years in coffee farming) 6. Family size	**Choice of Coffee Marketing Channel** This was measured as categorical variable with options such as: ▪ Cooperative ▪ Private trader ▪ Exporter

7. Access to off-farm employment

8. Primary occupation (farming vs. other)

9. Marital status

Description of Multinomial Logistic Regression Model Equation

In this study, the dependent variable was assumed as *Y*, which represented the choice of coffee marketing channel, with three categories:

- *Y* = *0* Private Traders (Reference category)
- *Y* = *1* Cooperatives
- *Y* = *2* Exporters

Then, $X_1, X_2, \ldots .. X_k$ represented the socio-economic independent variables such as age, education, income, etc.

Then, the **log-odds** for each category relative to the reference category were expressed as:

Equation 1: For Cooperatives (Y = 1):

$$\log\left(\frac{P(Y=1)}{P(Y=0)}\right) = \beta_{10} + \beta_{11}X_1 + \beta_{12}X_2 + \cdots \beta_{1k}X_k \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..$$

(2)

Equation 2: For Exporter (Y = 2):

$$\log\left(\frac{P(Y=2)}{P(Y=0)}\right) = \beta_{20} + \beta_{21}X_1 + \beta_{22}X_2 + \cdots \beta_{2k}X_k \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

(3)

Where:

- $P(Y = i)$, was the probability that a farmer chooses marketing channel *i*
- β_{ij}, were the regression coefficients for the predictor X_j in category *i*
- P(Y=0), was the probability of the reference category (Private Traders)

Objective two: To assess the influence of institutional factors on farmers' choice of coffee marketing channels in Mbale District.

Table 2: Selected Variables to address objective two

Independent Variables	Dependent Variable
1. Access to Credit 2. Access to Extension Services 3. Access to Market Information 4. Availability of Storage Facilities 5. Proximity to Market Infrastructure 6. Membership in Cooperatives 7. Access to Government Support 8. Perception of Legal Security	**Choice of Coffee Marketing Channel (Categorical – Nominal):** ▪ Cooperatives ▪ Exporters ▪ Private traders

Description of Multinomial Logistic Regression Model Equation

Purpose of the Model:

To estimate the probability that a coffee farmer in Mbale District chooses one of three **mutually exclusive** marketing channels (Cooperative, Private Trader, Exporter) based on institutional factors and farmer perceptions.

Dependent Variable (Categorical, Nominal):

Let Y_i represent the **choice of marketing channel** for farmer i, where:

Y_i = 1, if farmer chooses **Cooperative** (base/reference category)

Y_i = 2, if farmer chooses **Private Trader**

Y_i = 3, if farmer chooses **Exporter**

Therefore, **Model Equation:**

Let P_j, be the probability that a farmer chooses marketing channel j, given the explanatory variables X. The multinomial logistic regression model estimates:

$$\ln\left(\frac{P_j}{P_1}\right) = \beta_{0j} + \beta_{1j}X_1 + \beta_{2j}X_2 + \cdots + \beta_{kj}X_k; for\ j = 2, 3. \quad \text{.....} \quad (4)$$

Where;

P_j = Probability of choosing category j, (e.g., Private Trader or Exporter)

P_1 = Probability of choosing the **reference category** (Cooperative)

β_{0j} = Intercept term for outcome j.

β_{kj} = Coefficients associated with predictor X_k, for outcome j.

X_k = Institutional or intervening explanatory variables.

Table 3: Selected Explanatory Variables

Variable Name	Description
$X_1 =$ Access to Credit	1 = Yes, 0 = No
$X_2 =$ Access to Extension Services	1 = Yes, 0 = No
X_3 = Access to Market information	1 = Yes, 0 = No
X_4 = Availability of Storage Facilities	1 = Yes, 0 = No
X_5 = Cooperative Membership	1 = Member, 0 = Non-member
X_6 = Trust in Market Actors	Scale or Binary (e.g., 1=Trust, 0 = No Trust
X_7 = Attitude Towards Risk	Ordinal or Scale (e.g., Low to High Risk Aversion
X_8 = Perceived Fairness of marketing Channels	Scale (e.g., 1 to 5 Likert Scale)

Objective three: To evaluate the effect of farm-level characteristics on the selection of marketing channels in Mbale District.

Table 4: Selected Variables to address Objective three

Variable Type	Variable Name	Dependent Variable
Independent Variables (Farm-Level Characteristics)	- Farm Size - Coffee Yield - Farm Location - Production Techniques - Labour Availability - Farm Investment	- Farmers' Choice of Coffee Marketing Channel → Cooperatives → Private Traders → Exporters

- Crop Diversification
- Use of Technology

Statistical Approach

Model Specification:

$$ln\left(\frac{(Channel_i)}{P(Reference\ Channel)}\right) = \beta_0 + \beta_1 farm\ size + \beta_2 Coffee\ Yield + \beta_3 Farm\ location + \cdots + \beta_n Use\ of\ Technology. \quad \text{.....} \quad (5)$$

Where;

In the model, $P(Channel_i)$ refers to the probability of selecting the marketing channel (cooperatives or exporters), relative to private traders (the reference).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the findings and discussions structured in alignment with the study's objectives. The analysis is organized into two main sections: descriptive statistics and inferential statistics. The first section provides a comprehensive overview of the key characteristics of the study sample, including demographic, socio-economic, and farm-level variables. The second section delves into the inferential statistical analysis, examining the relationships among the variables and drawing insights based on the study's research questions. Discussions are integrated throughout to contextualize the findings within the existing body of literature and the study area's specific context.

4.2 Descriptive statistics of the Socio-demographic characteristics

Table 5: Distribution statistics of Continuous variables (n=384)

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Age (years)	384	53.4	11.7	26	77
Household Size (No. People)	384	6	3	1	17
Farming Experience (years)	384	13.9	10.4	2	40
Land Size Owned (Acreage)	384	3	2	0.5	10
Land under coffee (Acreage)	384	1.6	1	0.5	7
Household Income (USD)	384	108.0	30.0	50.0	200.0
Av. Coffee Production (kgs)	384	425.6	176.2	500	1600

The descriptive statistics of the sampled coffee farmers from study area presented in Table 5, reveals that the average age of the respondents was 53.4 years (SD = 11.7), indicating that the majority of the sampled farmers fall within the middle-aged demographic group. This finding suggests that coffee farming in the study is

predominantly practiced by individuals who are likely to possess considerable life experience, potentially contributing to their agricultural decision-making processes. Additionally, the average household size among the coffee farming households was 6 members (SD = 3). This relatively large household size reflects the communal and extended family structures common in rural Ugandan settings, which could influence labour availability and resource allocation within coffee farming practices.

Furthermore, the mean duration of farming experience in coffee production was found to be 13.9 years (SD = 10.4). This indicates that the sampled farmers generally had substantial experience in coffee farming, which could have enhanced their knowledge of agronomic practices and marketing strategies. The considerable variation in farming experience also suggests the inclusion of both relatively new and well-established coffee farmers in the sample.

In the context of coffee farming, the findings indicate that land ownership patterns indicate that the average land size among the sampled coffee farmers was 3 acres (SD = 2), with the mean area allocated to coffee cultivation being 1.6 acres (SD = 1). These findings underscore the prevalence of small-scale coffee farming in the district, as the majority of respondents operated on relatively limited land holdings. The average monthly income among coffee farmers was estimated at 108 USD (SD = 30), reflecting the modest economic returns associated with smallholder coffee production. Additionally, the mean coffee output per season was recorded at 425.6 kilograms (SD = 176.2), further illustrating the scale of production within the study area. These results highlight the constraints faced by coffee farmers in Mbale District, where limited land holdings and modest income levels may influence both production capacity and marketing decisions.

Table 6: Distribution of the Categorical Characteristics (n=384)

Variable	Attribute	Freq.	Percent	Cum.
Gender	Male	262	68.2	68.2
	Female	122	31.8	**100.0**
Educ. Level	No Formal Educ	62	16.1	16.1
	Primary	175	45.6	61.7
	Secondary	128	33.4	95.1
	Tertiary/University	19	4.9	**100.0**
Marital Status	Married	278	72.4	72.4
	Single	76	19.8	92.2
	Widowed/Divorced	30	7.8	**100.0**
Access to off-income	Yes	152	39.5	39.5
	No	232	60.5	**100.0**
Access to Credit	Yes	267	69.6	69.6
	No	117	30.4	**100.0**
Access to Ext. Service	Yes	208	54.1	54.1
	No	176	45.9	**100.0**
Primary Occupation	Farming	293	76.2	76.2
	Business	30	07.9	84.1
	Salaried occupation	61	15.9	**100.0**

The distribution of respondents by gender is presented in Table 6. The results indicate that the majority of coffee farmers in the study area are male, accounting for 68.2% of the sample, while females constitute only 31.8%. This finding suggests that coffee farming is a male-dominated activity in the study area, potentially reflecting existing gender norms and roles that influence access to and control over agricultural resources. Regarding the educational attainment of coffee farmers, the data reveal that 16.1% of the respondents had no formal education, while 45.6% had completed primary education. Additionally, 33.4% of the respondents had attained secondary education, and a small proportion (4.9%) had pursued either tertiary or university-level education. The relatively low levels of formal education among the coffee farmers may have implications for their ability to access and utilize agricultural information effectively, which could subsequently impact their farming practices and market participation.

The demographic characteristics of the respondents provide critical insights into the socio-economic profiles of coffee farmers in the study area. A majority of the respondents (72.4%) were married, indicating that marital status is a prominent feature among coffee farming households, potentially influencing labour availability, household income management, and decision-making processes in agricultural activities. In contrast, 19.8% of the respondents were single, suggesting that a smaller proportion of the sampled population may have less family-related financial obligations and may operate independently in coffee farming. A minority of the respondents (7.8%) were either divorced or widowed, which could imply varying levels of economic vulnerability, as single-headed households may face unique challenges in managing coffee production and other household responsibilities.

Income diversification among coffee farmers is a significant aspect that reflects the extent of income security and risk management strategies employed by households. The findings indicate that only 39.5% of the respondents had access to off-farm income, suggesting limited opportunities for income diversification beyond coffee production. Consequently, a substantial proportion of the respondents (60.5%) relied solely on income generated from coffee farming, highlighting the potential risk associated with income dependence on a single agricultural enterprise. Such

reliance may expose coffee farming households to income fluctuations caused by market volatility, adverse climatic conditions, or crop failure.

Access to credit is another critical factor influencing coffee production and overall economic stability among farmers. The findings reveal that 69.6% of the respondents had access to credit from local financing schemes available in the study area, indicating a relatively favourable financial environment for agricultural investment and business expansion. However, the remaining 30.4% of the respondents lacked access to such credit facilities, potentially constraining their capacity to invest in agricultural inputs, adopt improved farming technologies, or cope with unexpected financial shocks. These findings underscore the importance of enhancing financial inclusion mechanisms to support coffee farmers in the study area.

Access to extension services is a critical aspect influencing agricultural productivity and farmers' decision-making processes. In the current study, slightly more than half of the respondents (54.1%) reported receiving locally available extension services, whereas a significant proportion (45.9%) indicated a lack of access to these services. This finding underscores the uneven distribution of extension services among coffee farmers in the study area, potentially affecting their ability to adopt improved agricultural practices and technologies. Regarding the primary occupation of the sampled respondents, the majority (76.2%) identified themselves as primary coffee farmers, indicating a predominant focus on coffee farming as a primary economic activity. A smaller percentage (7.9%) were engaged in business activities, while 15.9% were employed in salaried occupations. These occupational categories reflect the economic diversification among respondents and provide insights into the socio-economic context within which coffee farming operates in the study area.

4.2 Relationship between farmers' socio-economic characteristics and their choice of coffee marketing channels.

Availability of appropriate marketing channels are critical for smallholder coffee farmers in improving their overall livelihood outcomes. Therefore, before the regression analysis, the Chi-square test of independence was performed to establish the level of association among the selected variables.

Table 7: Pairwise Test

Variable	X^2	df.	*p*-Value	*Interpretation*
Gender	5.81	4	0.032	Significant Association
Education level	12.58	7	0.024	Significant Association
Primary occupation	6.26	4	0.645	Not Significant
Marital status	4.92	2	0.462	Not Significant
Off-farm employment	9.66	6	0.001	Significant Association

The chi-square (x^2) test of independence was employed to assess the association between selected socio-economic variables and the outcome variable under study. The analysis revealed a statistically significant association between gender and the outcome variable, as indicated by the chi-square value of 5.81 with 4 degrees of freedom (df) and a p-value of 0.032 (Table 7). Since the p-value is less than the conventional alpha level of 0.05, it can be concluded that gender has a statistically significant relationship with the outcome variable.

Similarly, the chi-square test was applied to examine the association between education level and the outcome variable. The analysis yielded a chi-square value of 12.58 with 7 degrees of freedom and a p-value of 0.024, suggesting a significant association between education level and the outcome variable.

Further analysis was conducted to assess the relationship between off-farm employment and the outcome variable. The chi-square test resulted in a chi-square value of 9.66 with 6 degrees of freedom and a p-value of 0.001. Given that the p-value is less than 0.01, this finding indicates a highly significant association between off-farm employment and the outcome variable. This suggests that engagement in off-farm employment is significantly associated with the outcome variable, warranting further exploration to understand the nature and direction of this relationship, particularly while accounting for potential confounding variables.

Table 8: Factors influencing the Choice of Coffee Marketing Channel.

(Base outcome = Cooperative)

Variable	Private Trader (RRR)	*p*_Value	Exporter (RRR)	*p*_Value
Age of the farmer	1.026	0.176	1.020	**0.024**
Gender (1=male)	0.822	0.322	1.154	0.189
Education Level	1.364	**0.004**	1.461	**0.002**
Income (USD/Month)	1.0002	0.214	1.0004	**0.041**
Farming Experience	0.897	**0.002**	0.962	**0.034**
Household Size	1.422	0.221	0.884	0.708
Off-farm Income	0.942	**0.004**	1.163	0.798
Primary Occupation	1.084	0.346	1.412	**0.032**
Marital Status	0.651	0.228	0.892	0.526
Const.	-0.845	**0.023**	-1.174	**0.016**

Obs. 384; Log-Likelihood -392.614; Chi^2=85.234; Pseudo R^2 = 0.987; p_Value=<0.001

The findings from the multinomial logistic regression model, as presented in Table 8, demonstrate a strong model fit. The model yielded a Pseudo R^2 value of 0.987, which implies that approximately 98.7% of the variance in the choice of coffee marketing channels is explained by the independent variables included in the analysis. Such a high Pseudo R^2 value indicates a substantial explanatory power of the model and aligns with the threshold for model adequacy in discrete choice modelling, particularly in multinomial logistic regression (Long & Freese, 2014).

Furthermore, the likelihood ratio chi-square test was statistically significant, $x^2(DF) = 85.234$, $p < .001$, confirming that the full model fits significantly better than a null model with no predictors. This result suggests that the inclusion of explanatory

variables such as household characteristics, farm-level factors, institutional access, and marketing attributes meaningfully contributes to predicting the likelihood of a farmer selecting a particular marketing channel.

The negative intercept (constant) observed in the model for the base outcome category (cooperative) implies that, when all independent variables are held at zero, the probability of a farmer choosing to market their coffee through a cooperative is higher compared to choosing a private trader or an exporter. This finding is consistent with previous research indicating that smallholder farmers often rely on cooperatives due to their accessibility, collective bargaining power, and ability to offer fairer prices (Barham & Chitemi, 2009; Fischer & Qaim, 2014). The implication here is that, in the absence of external influences or enabling conditions (e.g., market information, transportation, access to credit), farmers are inclined to default to more familiar and less risky marketing arrangements such as cooperatives.

In addition, the multinomial logistic regression results indicated that under the *private trader* category, the variable educational level was statistically significant ($p = .004$). This suggests that farmers with higher levels of education were significantly more likely to sell their coffee to private traders or exporters rather than through cooperatives.

These findings are consistent with previous research indicating that education enhances farmers' ability to access, interpret, and utilize market information more effectively, thereby influencing their marketing decisions (Mukarumbwa et al., 2022). Educated farmers are also more likely to appreciate quality requirements and payment structures offered by private buyers, which may not be as readily communicated or accessible through cooperative channels. Additionally, education increases farmers' confidence in engaging in independent negotiations with traders and exporters, thus reducing reliance on traditional or community-based cooperative systems.

Furthermore, educated farmers may be more adept at managing production records, complying with export standards, and leveraging digital tools for price monitoring, all of which are prerequisites for entering into trade relationships with private buyers (Mabaya et al., 2020). Therefore, the observed significance of educational level highlights its role as a determinant in channel choice, reinforcing the

importance of promoting farmer education in marketing-focused agricultural interventions.

In the same vein, the multinomial logistic regression model results in Table 4, revealed that farming experience had a significant influence on the choice of marketing channel among smallholder coffee farmers. Specifically, when comparing the likelihood of selling to private traders or exporters versus cooperatives (the reference category), farming experience exhibited a Relative Risk Ratio (RRR) of 0.897, with a p-value of .0002. This implies that for each additional year of experience in coffee farming, the likelihood of choosing to sell to private traders or exporters relative to cooperatives decreases by approximately 10.3% (1 – 0.897), holding all other factors constant.

The negative association suggests that more experienced farmers are less likely to rely on cooperatives and instead prefer alternative market channels such as private traders or exporters. This may be attributed to the fact that seasoned farmers have accumulated greater knowledge of market dynamics, established better social networks, and developed stronger bargaining power, thereby increasing their confidence in engaging with private buyers who often offer more competitive prices (Barrett et al., 2012; Fischer & Qaim, 2012). Moreover, experienced farmers are likely to be more aware of the inefficiencies or delays associated with cooperative systems and may prefer channels that ensure quicker payment and less bureaucratic interference. These findings align with previous studies which have documented that farming experience enhances market access and improves the ability to negotiate favourable terms (Abdulai & Birachi, 2009; Okello et al., 2016).

In addition, the results in Table 4, reveal that off-farm income significantly influences the likelihood of choosing a particular coffee marketing channel. Specifically, the Relative Risk Ratio (RRR) for off-farm income was 0.942, with a statistically significant *p*-value of 0.004 when comparing the likelihood of a farmer selling to a private trader and exporter trader relative to a cooperative society (used as the base outcome). This RRR being less than one indicates a negative association between off-farm income and the probability of choosing the private trader channel.

Interpretatively, for every unit increase in off-farm income, the relative risk of a farmer choosing to market their coffee through a private trader or exporter trader

as opposed to a cooperative decrease by approximately 5.8%, holding all other variables constant. This finding implies that farmers who earn higher incomes from non-agricultural sources are less inclined to rely on private traders and more likely to participate in organized marketing groups such as cooperatives. This trend may be attributed to the relative financial independence that off-farm income provides, enabling farmers to delay coffee sales until favourable prices are available through cooperatives, which typically offer better collective bargaining power and support services (Mujawamariya et al., 2013; Jagwe et al., 2010).

Moreover, these findings resonate with prior research which suggests that off-farm income diversification can reduce farmers' immediate liquidity needs, allowing them to avoid distress sales to middlemen or traders who often offer lower prices at farm gates (Barrett et al., 2001; Ali & Erenstein, 2017). Thus, off-farm income acts as a buffer that enhances farmers' market participation choices in favour of more organized and potentially lucrative channels.

The results in Table 4, also revealed that age of the respondent was found to be statistically significant with a Relative Risk Ratio (RRR) of 1.020 and a *p*-value of 0.024. This indicates that, holding other factors constant, a one-year increase in the respondent's age was associated with a 2.0% increase in the relative likelihood of choosing the exporter channel over cooperatives. This finding aligns with previous studies that suggest age can influence risk preference and marketing decisions among smallholder farmers (Ainembabazi & Mugisha, 2014).

Similarly, education level was positively associated with the choice of exporter marketing channels. The RRR for education level was 1.461, with a statistically significant *p*-value of 0.002. This implies that higher levels of education increased the likelihood of selecting the exporter channel by 46.1% compared to cooperative marketing. Education likely enhances access to market information and the ability to evaluate competitive pricing structures, leading to more informed marketing decisions (Mutenje et al., 2019).

The respondent's monthly income also had a statistically significant but modest effect, with an RRR of 1.0004 and a *p*-value of 0.041. Although the magnitude appears small, the significance indicates that even slight increases in income may tilt marketing choices towards more commercialized channels such as exporters.

This is consistent with the argument that financial capability increases a farmer's ability to absorb market transaction costs (Barrett, 2008).

Furthermore, primary occupation showed a significant influence on market channel choice, with an RRR of 1.412 and a *p*-value of 0.032. Respondents whose main occupation was farming were 41.2% more likely to choose the exporter route compared to cooperatives. This finding supports the notion that individuals fully engaged in farming as a primary livelihood are more commercially oriented and likely to seek high-value market opportunities (Ochieng et al., 2021).

Experience in Arabic coffee farming was found to have a statistically significant influence on the likelihood of choosing a particular marketing channel. Specifically, the relative risk ratio (RRR) associated with Arabic coffee farming experience was 0.962, with a p-value of 0.034, indicating a statistically significant effect at the 5% level. This suggests that for every additional year of experience in Arabic coffee farming, the likelihood of selling coffee through alternative marketing channels (relative to the reference category) decreases by approximately 3.8%.

This inverse relationship implies that farmers with more years of experience in Arabic coffee cultivation are less likely to sell their produce through informal or less structured channels, possibly due to increased knowledge, networks, and market preferences developed over time. Experienced farmers may also be better positioned to access formal and more profitable market avenues, such as cooperative unions or direct sales to processors, as they are likely to have accumulated more social capital, market information, and trust relationships (Barrett et al., 2021; Muthini et al., 2020). These findings are consistent with previous studies that underscore the role of farming experience in shaping marketing decisions among smallholders. Experience enhances farmers' decision-making capabilities, risk management, and negotiation skills, which are critical for participating in organized and remunerative markets (Chagwiza et al., 2016; Mwaura et al., 2022).

4.3 Institutional factors and coffee marketing channels

Institutional determinants play a pivotal role in shaping smallholder farmers' decisions regarding the marketing pathways they adopt for their agricultural commodities. Within the context of coffee production, such decisions are often

mediated by a combination of external support systems, informational access, and organizational affiliations, which collectively influence market participation and revenue outcomes.

The analysis revealed that a substantial proportion of respondents lacked access to formal credit services. Specifically, 46.6% of the sampled coffee farmers reported having access to credit, while a slight majority (53.4%) indicated no access to such financial support (see Figure 1). This suggests that most farmers rely predominantly on personal savings or informal financing mechanisms to sustain their coffee production and marketing activities. Limited access to credit can significantly constrain the capacity of smallholder farmers to invest in productivity-enhancing inputs, ultimately affecting their competitiveness in the coffee value chain (World Bank, 2021).

Regarding extension service delivery, the results show that more than half of the respondents (55.2%) had access to agricultural extension services, while 44.8% did not. This finding indicates a relatively moderate level of extension service outreach in the study area. Access to extension services is critical for disseminating improved production and marketing practices, enhancing farmers' decision-making, and facilitating linkages to markets and support services (Anderson & Feder, 2007).

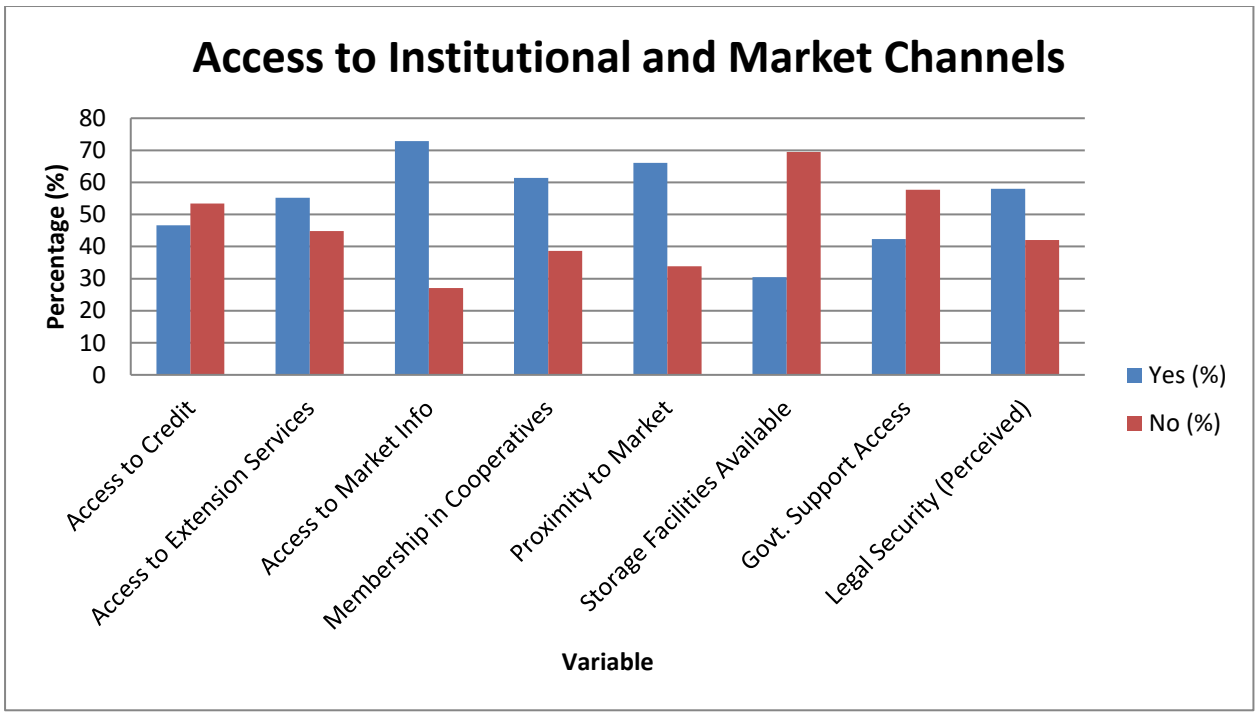

Figure 3: Distribution of Institutional factors

In addition, the study sought to examine the extent of access to coffee markets and associated infrastructure among smallholder coffee farmers. The results indicate that a significant majority of the respondents (72.9%) reported having access to coffee markets, while 27.1% faced challenges in accessing these markets. This suggests that while market access is generally favourable for most respondents, a notable proportion still experiences barriers, which may hinder their participation in commercial coffee production.

Further analysis, as illustrated in Figure 3, reveals that 66.1% of the farmers resided within proximate distances to coffee markets, indicating relative ease of market reach for the majority. Conversely, 33.9% of the respondents reported living in areas far from coffee market centres, which could contribute to increased transportation costs and reduced market participation (World Bank, 2020). In terms of access to storage facilities, only 42.5% of the respondents indicated that they had access to such facilities, while the majority (57.5%) lacked storage options within reasonable proximity. Limited access to storage may negatively affect farmers' ability to store coffee for better prices, thus exposing them to post-harvest losses and lower incomes (FAO, 2019).

Regarding legal land security, 58% of the respondents reported feeling secure in their land tenure, while 42% lacked such security. Secure land tenure has been widely recognized as a key determinant in encouraging agricultural investment and long-term planning among smallholder farmers (Deininger & Byerlee, 2011). However, the data suggest that nearly half of the respondents may lack the legal assurance needed to make substantial agricultural investments. On the aspect of government-provided support, such as policing or community safety mechanisms and only 42.3% of respondents reported having access.

4.3.1 Comparison Analysis Coffee market channels in the study area

A comparative analysis of coffee marketing channels in the study area was conducted, focusing on the institutional factors influencing smallholder farmers' choice among different market outlets. Using a Multinomial Logit Model, the analysis specifically compares category 2 (Private Trader) and category 3 (Exporter) against the base outcome, category 1 (Cooperative), to identify key institutional factors that drive farmers' marketing decisions.

Table 9: Comparison of Institutional factors and Coffee Marketing Channels

Variable	(Private Trader) Coef.	*p*_value	(Exporter) Coef.	p_value
Access to Credit	0.642	**0.023***	0.891	**0.012***
Access to extension services	-0.421	0.482	0.142	**0.024***
Market information	0.875	**0.002****	1.034	0.002
Access to storage facilities	-0.389	0.417	0.302	0.310
Market proximity	0.115	**0.023***	0.678	**0.012***
Cooperative membership	-1.048	**0.001****	-0.978	**0.014***
Access to government support	0.953	0.415	0.652	0.176
Legal security	0.240	0.532	0.439	0.113
Cons.	1.032	**0.000***	0.214	**0.001***
Obs. 384; Pseudo R^2 = 0.875; Chi^2 = 192; p<0.001; (*p < 0.05, **p < 0.001)				

Overall Model Fit of the Multinomial Logistic Regression

The overall statistical output of the multinomial logistic regression model presented in Table 9, demonstrated a good model fit. The analysis was based on 384 observations. The model yielded a likelihood ratio chi-square (x^2) statistic of 192 with a corresponding p-value of less than 0.001. This result indicates that the full model, which includes the predictor variables, provides a significantly better fit to the data compared to the null model (without predictors), suggesting that the inclusion of the independent variables improves the model's predictive ability.

Furthermore, the model produced a Pseudo R^2 value of 0.875. Although not directly comparable to the R^2 statistic in ordinary least squares regression, the Pseudo R^2

provides an indication of the explanatory power of the model. A value of 0.875 implies that approximately 87.5% of the variation in the dependent variable is accounted for by the predictor variables included in the model. This high Pseudo R^2 value suggests that the model has strong explanatory capability. Therefore, the multinomial logistic regression model employed in this study is statistically significant and demonstrates an excellent fit to the data, indicating that the set of predictors collectively explains a substantial proportion of the variation in the outcome variable.

Further, the results in Table 9, indicated that access to credit significantly influenced the choice of coffee marketing channels among smallholder farmers. Using cooperatives as the reference category, the model revealed that access to credit was positively and significantly associated with the likelihood of choosing both private traders and exporters. Specifically, farmers with access to credit were more likely to market their produce through private traders (β = 0.642, p = .023) compared to cooperatives. Similarly, access to credit significantly increased the likelihood of selecting the exporter channel (β = 0.891, p = .012) over cooperatives. These findings suggest that financial accessibility plays a crucial role in empowering farmers to engage in more lucrative or preferred marketing arrangements outside of cooperative structures. The positive coefficients indicate that as farmers gain access to credit, their log-odds of choosing private traders and exporters over cooperatives increase. This may be attributed to the enhanced bargaining power, transaction flexibility, and operational independence credit affords (Barrett, 2008; Mwakubo et al., 2013). Credit enables farmers to meet immediate harvest-related needs, fulfill contractual obligations, and potentially access better pricing through competitive channels like private traders and exporters (World Bank. 2020).

Results in Table 9, also indicate that access to agricultural extension services significantly influenced smallholder farmers' choice of coffee marketing channels in the study area. Specifically, access to extension services was positively associated with the likelihood of choosing exporters as a marketing channel relative to cooperatives, with a regression coefficient (β) of 0.142 and a p-value of 0.024. This p-value is below the conventional threshold of 0.05, signifying statistical significance (Field, 2018; Hair et al., 2019). The positive coefficient suggests that, holding other factors constant, farmers with access to extension services were more likely to sell

their coffee to exporters rather than through cooperatives. This finding implies that extension services may enhance farmers' awareness of export market standards, quality requirements, and potential profitability—factors that can motivate them to engage directly with exporters who often offer higher prices and more stable market conditions (Anderson & Feder, 2007; Davis et al., 2021).

These results support the broader literature on the role of agricultural extension in improving market participation. Extension services often act as a conduit for information dissemination, technology adoption, and capacity building among smallholder farmers (Feder, Murgai, & Quizon, 2004). In the context of marketing, such services can help farmers navigate complex market systems, understand buyer requirements, and build the necessary competencies to meet the demands of higher-value markets.

As regards to results in Table 9, access to market information significantly influenced farmers' choice of marketing channel for coffee. Specifically, the coefficient for access to market information when predicting the likelihood of selling to private traders as opposed to cooperatives was ß = 0.875, with a p-value = .002. This suggests that smallholder coffee farmers with better access to market information were significantly more likely to sell their produce to private traders rather than cooperatives.

A positive coefficient indicates an increased log-odds of selecting private traders over cooperatives as the preferred marketing channel, holding all other factors constant. The statistical significance at the 1% level ($p < .01$) underscores the strength of this relationship. These findings align with previous literature suggesting that access to timely and relevant market information enhances farmers' negotiation power and their ability to exploit more profitable market outlets (Barrett, 2008; Fafchamps & Minten, 2012). Private traders are often perceived as more responsive and less bureaucratic compared to cooperatives, thereby attracting farmers who are better informed about market prices and demand dynamics (Magesa, Michael, & Ko, 2014). These results imply that improving information dissemination systems, such as mobile-based price alerts or extension services could influence farmers' marketing behaviours, potentially shifting them away from traditional cooperative systems towards more dynamic and possibly more lucrative private trade engagements.

The results presented in Table 9, also revealed that Market proximity was found to have a positive and statistically significant effect on the likelihood of selling coffee to both private traders and exporters, compared to the local market. Specifically, the coefficient for market proximity was ß = 0.115, *p* = .023 for private traders, and ß = 0.678, *p* = .012 for exporters. This implies that for each unit increase in the perception or ease of market access, the log-odds of selling to a private trader and an exporter increase by 0.115 and 0.678 respectively, holding other variables constant. These findings align with previous literature that highlights the critical role of geographical proximity and ease of access in shaping smallholder marketing decisions (Barrett, 2008; Fischer & Qaim, 2014). Farmers closer to market centres or those with better transportation access are more likely to sell to structured market actors due to reduced transaction costs and better price incentives.

Conversely, cooperative membership was found to significantly decrease the likelihood of selling to private traders and exporters. The model estimated a coefficient of ß = -1.048, *p* = .001 for private traders, and ß = -0.978, *p* = .014 for exporters. These negative coefficients indicate that farmers affiliated with cooperatives are significantly less likely to sell to these alternative channels, possibly due to loyalty obligations, collective marketing arrangements, or contractual bindings within cooperative structures. This is consistent with the argument that cooperatives often centralize marketing decisions and reduce individual member interactions with other market players (Bernard & Spielman, 2009; Wossen et al., 2017). Membership in a cooperative may provide alternative benefits such as access to credit, inputs, and extension services, thereby reducing the incentive to engage with private traders or exporters independently.

4.4 Effect of farm-level characteristics on the selection of marketing channels

The selection of marketing channels is a strategic decision that profoundly influences the income and livelihoods of smallholder farmers. As agricultural markets become increasingly commercialized and complex, farmers must choose among marketing options that differ in accessibility, transaction costs, and profitability. This choice is shaped by various farm-level characteristics, such as farm size, production capacity, asset endowment, access to market information, and transport infrastructure. This objective aimed at examining the influence of

farm-level characteristics on the choice of marketing channels available in the study area.

Table 10 presents the descriptive statistics related to key farm-level characteristics of coffee production among the sampled respondents. The average land size under coffee cultivation was 5.14 acres (SD = 2.82), with a minimum of 0.55 acres and a maximum of 9.91 acres. In terms of labour employment, farmers reported an average of 6 workers (SD = 2.60), ranging from a minimum of 1 worker to a maximum of 11 workers per coffee farm. Regarding the adoption of production technologies, respondents reported using an average of 2 technologies (SD = 1.84), with the minimum number of technologies used being 1 and the maximum being 4. The average financial investment in coffee production at the farm level was reported to be USD 2,440.94 (SD = 1,383.42), with a minimum investment of USD 101.63 and a maximum of USD 4,977.85.

Furthermore, the analysis of yield performance among the sampled smallholder farms revealed a mean harvest of 803.55 kilograms per farm (SD = 412.35). Yield levels varied considerably across farms, with the lowest recorded yield being 115.35 kilograms and the highest reaching 1,499.60 kilograms. This variation reflects potential differences in production practices, input use, environmental conditions, or farmer-specific characteristics influencing productivity. An analysis of the distribution of coffee marketing channels utilized by smallholder farmers revealed three primary outlets. A significant proportion of farmers (35.94%) sold their coffee through exporters, while cooperatives accounted for 33.07% of the marketing transactions. The remaining 30.99% of farmers relied on private traders as their preferred marketing channel. These findings suggest a relatively balanced distribution among the three channels, with a slight preference toward exporters. The close percentages indicate that farmers might be influenced by multiple factors, such as price incentives, market access, and institutional support, when selecting their marketing outlets.

Table 10: Distribution of farm characteristics (n=384)

Variable		Obs	Mean	Std.	Min.	Max.
Farm size under coffee (Acres)		384	5.14	2.82	0.55	9.91
Farm workers employed (number)		384	6.0	2.6	1.0	11.0
Farm technologies used (number)		384	2.0	1.84	2.0	4.0
Farm Investment (USD)		384	2440.94	1383.42	101.63	4977.85
Coffee yield (kgs/acre)		384	803.55	412.35	115.20	1499.60
Variable	**Attribute**		**Freq.**	**Percent**	**Cum.**	
Market Channels	Exporters		138	35.94	35.94	
	Cooperatives		127	33.07	69.01	
	Private Traders		119	30.99	**100.0**	
Production Techniques	Use of Organics		132	34.38	34.38	
	Integrated		127	33.07	67.45	
	Conventional		125	32.55	**100.0**	
Farm Location	Rural		130	33.85	33.85	
	Urban		124	32.30	66.15	
	Peri-urban		130	33.85	**100.0**	

In terms of production techniques, the data indicate that coffee farmers employ a variety of agronomic approaches. Approximately 34.38% of farmers practiced organic farming, which may be attributed to increasing consumer demand for sustainably grown coffee and awareness of environmental conservation. Meanwhile, integrated farming systems, which combine multiple cropping and livestock

strategies to enhance productivity and sustainability, were employed by 33.07% of farmers. The use of conventional farming methods, involving synthetic fertilizers and chemical pesticides, was reported by 32.55% of respondents. These results reflect a relatively even adoption of production practices, potentially shaped by access to knowledge, resources, and environmental conditions. Regarding farm location by agroecological zone, the farms were almost evenly distributed across three major topographic zones. Approximately 33.85% of farms were situated in rural areas, while urban regions accounted for 32.29%. An equal proportion (33.85%) was located in peri-urban zones. The nearly uniform distribution of farms across different elevations may have implications for both the quality and quantity of coffee produced, given the influence of altitude on coffee flavor profiles, pest prevalence, and crop yields.

4.5 Preliminary Statistical Tests for Model Assumptions

Before conducting the econometric analysis, diagnostic tests were performed to assess the suitability of the dataset for regression modelling. Specifically, normality and multicollinearity tests were conducted to ensure that the assumptions underlying the use of multinomial logistic regression were not violated.

4.5.1 Tests for Normality and Association

Normality tests are essential in regression analysis, particularly for ensuring the proper specification of the model and evaluating the distribution of residuals (Gujarati & Porter, 2009). In this study, normality was assessed indirectly through the application of t-tests for continuous variables and chi-square tests for categorical variables. The t-tests evaluated the distribution of continuous independent variables, while the chi-square tests assessed the association between categorical predictors and the dependent variable, which in this case was the choice of coffee marketing channel.

As shown in Table 11, the chi-square test results revealed statistically significant associations between farm location and crop diversification with the choice of marketing channel (x^2, p = .024 and p = .022, respectively). These results suggest that the categorical variables in question exhibit meaningful relationships with the dependent variable and are appropriate for inclusion in the regression model.

Moreover, normality testing contributes to assessing model goodness-of-fit. According to Wooldridge (2016), when residuals deviate significantly from normality, it may indicate model misspecification or omission of relevant explanatory variables.

4.5.2 Multicollinearity Diagnostics

To examine potential multicollinearity among the explanatory variables, the Variance Inflation Factor (VIF) was computed. Multicollinearity refers to a situation where independent variables are highly correlated, which can distort the estimated coefficients and compromise the reliability of the model (Montgomery et al., 2012).

Table 8 presents the VIF results for the predictor variables. The VIF values ranged from 1.16 to 2.37, with a mean of 1.75. These values fall well below the commonly accepted threshold of 10, indicating the absence of multicollinearity concerns (O'Brien, 2007). Therefore, the predictors included in the model were considered to be sufficiently independent, validating the structural integrity of the regression analysis.

Table 11: Chi-Square Tests (Categorical Variables Vs. Marketing Channels)

	Farm Location			
Coffee Mkt Channels	**Rural**	**Peri-urban**	**Urban**	**Total**
	130	124	130	384

Pearson Chi^2 (4) = 12.32; Pr = 0.024

	Crop Diversification		
Coffee Mkt Channels	**Yes**	**No**	**Total**
	282	102	384

Pearson Chi^2 (2) = 6.23; Pr = 0.022

Table 12: Estimation of Variance Inflation Factors (VIF)

Variable	VIF	1/VIF
Coffee_yield	2.37	0.42
Farm_invest.	2.14	0.47
Farm_size	1.89	0.53
Labour_avail.	1.60	0.63
Tech_use	1.66	0.60
Prod_tech.	1.42	0.70
Farm_location	1.16	0.86
Mean VIF	**1.75**	

4.5.3 Multinomial Logistic Regression Results

The results of the multinomial logistic regression (MNL) model assessing the factors influencing smallholder farmers' choice of coffee marketing channels are presented in Table 9. The overall model was statistically significant, indicating that the included explanatory variables collectively predict the choice of market channel better than a model with no predictors. Specifically, the likelihood ratio chi-square test yielded a value of x^2 (18) = 76.48, with a p-value less than 0.001, suggesting a good model fit. The pseudo-R^2 value was 0.086, implying that approximately 8.6% of the variation in the dependent variable—choice of marketing channel—was explained by the independent variables included in the model.

Although pseudo-R^2 values are typically lower in discrete choice models compared to linear regression models, values in the range of 0.05 to 0.20 are generally considered acceptable in multinomial logistic regression analyses, especially when the outcome variable comprises multiple categories (McFadden, 1974; Long & Freese, 2014). Therefore, the current model demonstrates an acceptable level of explanatory power in the context of coffee market channels in the study area

These results justify further interpretation of the individual coefficients in subsequent sections, where the marginal effects and relative risk ratios will be analysed to understand how each predictor influences the likelihood of a farmer selecting a specific market channel over the reference category.

Table 13: Effect of farm Characteristics on the Marketing Channels

Coffee Mkt Channels	Coef.	Std.	Z	P>|Z|	[95% conf. Interval]	
Private Traders			*(base outcome)*			
Cooperatives						
Farm_size	0.524	0.416	3.64	**0.002**	0.221	0.602
Coffee_yield	0.012	0.005	2.42	**0.014**	0.002	0.022
Farm_location	0.314	0.144	2.32	**0.024**	0.036	0.367
Prod_tech.	0.312	0.124	0.39	0.135	-0.143	0.536
Labour_avail.	0.241	0.362	3.25	0.124	0.109	0.562
Farm_invest.	0.003	0.000	4.50	**0.000**	0.003	0.001
Tech_use	0.489	0.210	3.26	**0.002**	0.408	0.609
Exporters						
Farm_size	0.782	0.128	3.68	**0.000**	0.436	1.562
Coffee_yield	0.005	0.000	3.57	**0.000**	0.003	0.002
Farm_location	0.554	0.164	3.53	**0.002**	0.922	0.788
Prod_tech.	0.522	0.172	1.75	0.118	-0.055	0.586
Labour_avail.	0.174	0.075	4.12	0.202	0.022	0.034
Farm_invest.	0.001	0.003	3.16	**0.004**	0.113	1.131
Tech_use	0.694	0.245	3.23	**0.002**	0.251	1.311

Obs. = 384; LR $chi^2(18) = 76.48$; Prob>$chi^2 = 0.000$; Pseudo $R^2 = 0.086$.

In addition, the results in Table 9 reveal that farm size had a statistically significant influence on the likelihood of a farmer choosing cooperative or exporter market channels, as opposed to selling through private traders. Specifically, the multinomial logistic regression results indicate that for every unit increase in farm size (measured in acres), the log-odds of a farmer selling coffee through cooperatives increased significantly (β = 0.524, p = .002). Similarly, the log-odds of selecting the exporter market channel also increased substantially with farm size (β = 0.782, p < .001).

These findings suggest that farmers managing larger coffee farms are more likely to engage with formalized market channels such as cooperatives and exporters, rather than with private traders. This pattern can be attributed to the economies of scale that larger farm sizes provide, enabling farmers to meet the bulk quantity requirements and quality standards typically demanded by cooperatives and exporters (Minten et al., 2019). Additionally, larger farm sizes often correlate with increased access to information, credit, and extension services, which further enhances farmers' capacity to participate in structured marketing arrangements (Barrett et al., 2021). These results align with existing literature, which emphasizes that landholding size is a critical determinant in farmers' marketing behaviour and their ability to participate in high-value markets (Sitko & Jayne, 2014; Fischer & Qaim, 2012).

As regards to how coffee yield influenced smallholder farmers' choice of coffee marketing channels, focusing on cooperatives and exporter channels in comparison to private traders as the base category. The results from the multinomial logistic regression model revealed that coffee yield had a statistically significant and positive association with the likelihood of farmers choosing either cooperatives or exporter marketing channels over private traders. Specifically, the coefficient for coffee yield under cooperative channels was 0.012 with a p-value of 0.014, while the coefficient under the exporter market channel was 0.005 with a p-value of 0.000. These findings suggest that an increase in coffee yield significantly increases the probability of a farmer marketing through cooperatives or exporters rather than private traders. The positive coefficients indicate that higher yields enhance the comparative advantage of more organized and formal market channels, which are generally more selective and quality-conscious.

The significant relationship observed can be attributed to the market demands of cooperatives and exporters. These channels are often characterized by stringent quality requirements, including specific moisture content, bean size, and post-harvest handling standards, which necessitate more productive farming practices. Therefore, farmers with higher yields are likely to meet or exceed these requirements, positioning them better to access and benefit from these premium markets (ICO, 2021; Jassogne et al., 2017). Additionally, these channels often offer better prices, technical support, and access to inputs or credit, which may further incentivize productive farmers to align with them (Mendez et al., 2010). Exporters, for instance, commonly engage in contractual arrangements or certification schemes such as Fairtrade and Organic, which also demand higher quality and quantity of produce. Similarly, cooperatives may prioritize bulk marketing and collective quality assurance practices, making them more attractive to farmers with relatively higher yields.

This finding aligns with the theoretical underpinning of transaction cost economics, which posits that producers with higher marketable surplus are more inclined to engage with formal markets to minimize per-unit transaction costs and maximize returns (Williamson, 1985). Moreover, it underscores the relevance of institutional quality and productivity as critical drivers of market participation and commercialization among smallholder farmers in developing countries (Barrett, 2008).

The location of the farm was found to have a statistically significant influence on the likelihood of farmers choosing both cooperative and exporter market channels over private traders. Specifically, the results of the multinomial logistic regression model revealed that the coefficient for farm location in relation to cooperative markets was 0.314 ($p = .002$), while for exporter markets, the coefficient was higher at 0.554 ($p = .002$). These findings suggest that farm location plays a crucial role in determining the marketing outlet chosen by smallholder coffee farmers. The positive and statistically significant coefficients indicate that farmers located in urban and peri-urban areas were more likely to market their coffee through cooperatives and directly to exporters compared to those in rural areas, who predominantly sell to private traders. This outcome may be attributed to the better access to infrastructure, information, and organized marketing systems typically

found in urban and peri-urban settings. Cooperatives and exporters often prefer to work with farmers who are easily accessible and can meet volume and quality requirements more consistently (Barham & Chitemi, 2009; Muthini et al., 2021).

Moreover, proximity to urban centres likely reduces transaction costs and improves access to critical services such as extension advice, certification programs, and quality enhancement training—factors that are more readily available in cooperatively organized and export-oriented channels (Ortiz et al., 2020). In contrast, farmers in more remote areas may face challenges such as poor road infrastructure and limited market information, thereby defaulting to local private traders who offer more accessible albeit less lucrative market options (Jagwe, Ouma, & Machethe, 2010). These findings align with the theory of agricultural commercialization, which posits that market access and institutional support are key determinants of farmers' decisions to engage with high-value markets (Pingali, 1997). Thus, enhancing the market orientation of rural farmers may require targeted interventions that improve physical infrastructure and foster stronger linkages with formal market structures.

Farm investment was found to be a significant positive determinant for both cooperative and exporter marketing channels. For farmers marketing through cooperatives, the coefficient was 0.003 with a p-value of 0.000, indicating a highly significant relationship. Similarly, for the exporter channel, the coefficient was 0.001 with a p-value of 0.004, also signifying statistical significance at the 1% level. This implies that incremental increases in farm investment, such as spending on inputs, infrastructure, and production practices, are positively associated with the likelihood of farmers engaging with structured and potentially high-value marketing channels. These findings align with previous literature that underscores the role of farm-level investments in enabling farmers to meet the quality and quantity thresholds often required by formal buyers (Jagwe et al., 2010; Muthini et al., 2021). Coffee farmers who invest in improved agronomic practices and post-harvest handling are often better positioned to benefit from economies of scale and improved bargaining power, which are more accessible through cooperative and exporter arrangements.

The application of improved technology in coffee production also emerged as a strong and significant determinant of marketing channel choice. For farmers using the cooperative channel, the coefficient for technology use was 0.489 (p = 0.002), while for those using the exporter channel, the coefficient was even higher at 0.694 (p = 0.002). These positive and statistically significant results suggest that farmers who adopt advanced agricultural technologies, including disease-resistant varieties, mechanized tools, and modern processing methods, are more likely to access and participate in lucrative marketing pathways. This positive association may be attributed to the compatibility between technological sophistication and the quality standards often demanded by cooperatives and exporters. Technologies that enhance productivity, consistency, and traceability in coffee farming can improve farmers' eligibility for contracts and premium prices offered in formal markets (Borelli et al., 2019; Wainaina et al., 2022). Furthermore, the adoption of technology often signals a farmer's commitment to professionalism and long-term market engagement, qualities that cooperatives and exporters highly value.

4.6 In Summary

In this chapter, the findings and discussions presented, are systematically aligned with the specific objectives of the study. The statistical analysis was organized into two primary sections: descriptive statistics and inferential statistics. The descriptive section offered a comprehensive summary of the key characteristics of the sample population, including demographic, socio-economic, and farm-level variables. This provided the necessary context for understanding the profile of the respondents participated in this study. Further, the inferential statistics focused on examining relationships among variables in line with the study's research questions.

The analysis for the first objective aimed to examine the socio-demographic factors that influenced smallholder farmers' choice of coffee marketing channels in the study area. A multinomial logistic regression model was employed, with cooperative marketing channels specified as the base outcome. The results indicated that the respondent's level of education was statistically significant in influencing the choice of both private traders (p = .004) and exporters (p = .002). Age was statistically significant only in the exporter category (p = .024), while household income significantly influenced the likelihood of marketing through the exporter channel (p = .041). Farming experience also emerged as a significant factor in both the private

trader (p = .002) and exporter (p = .034) categories. Off-farm income had a statistically significant effect in the private trader category (p = .004). In addition, the respondent's primary occupation was statistically significant under the exporter category (p = .032). Therefore, findings for objective one, suggested that socio-demographic characteristics played a critical role in determining farmers' participation in different coffee marketing channels, reflecting the importance of individual and household-level factors in marketing decisions.

The second objective of the study sought to examine the institutional factors that influence smallholder farmers' choice of coffee marketing channels. To address this objective, a multinomial logistic regression model was employed, enabling the assessment of the likelihood of farmers selecting specific marketing channels, namely private traders and exporters, as influenced by various institutional factors. The model estimated the relative risk ratios (RRRs) and their corresponding p-values to determine the statistical significance of the explanatory variables.

The results indicated that access to credit significantly influenced farmers' participation in both private trader and exporter channels. Specifically, access to credit was statistically significant with a p-value of 0.023 for farmers marketing through private traders and 0.012 for those using exporter channels. Access to extension services also emerged as a significant predictor for the exporter category (p = 0.024), suggesting that farmers who receive advisory services are more likely to engage with exporter marketing channels. Access to market information was found to be highly significant for the private trader channel (p = 0.002), highlighting the role of timely and reliable market data in shaping marketing decisions. Furthermore, market proximity significantly influenced marketing channel choice, with p-values of 0.023 and 0.012 for private traders and exporters, respectively. This underscores the importance of physical access to market locations in determining marketing behaviour.

Cooperative membership also played a pivotal role in channel selection. The analysis revealed a strong statistical association between cooperative membership and the use of both private trader (p = 0.001) and exporter (p = 0.014) marketing channels. These findings suggest that institutional support mechanisms, including access to financial services, extension and market information, geographic accessibility, and

group-based marketing through cooperatives, significantly shape smallholder farmers' marketing channel choices.

In line with the third objective of this study, which sought to examine the influence of farm characteristics on the selection of coffee marketing channels, a descriptive statistical analysis was initially conducted to establish the distribution of farmers across the available marketing options. The findings revealed that a significant proportion of the sampled respondents (35.94%) marketed their coffee through the exporter channel. This was followed by 33.07% of the farmers who sold their produce through cooperative societies. The smallest proportion, representing 30.99% of the respondents, marketed their coffee through private traders. These descriptive results provide a preliminary understanding of farmers' marketing behaviour and serve as a basis for further econometric analysis to determine the underlying farm-level factors influencing these marketing decisions.

As a crucial diagnostic step in regression modelling, multicollinearity testing was conducted to assess the degree of linear association among the explanatory variables included in the analysis. The primary objective was to ensure that the selected independent variables met the assumption of no severe multicollinearity, which could otherwise distort the reliability of the coefficient estimates and weaken the interpretability of the model (Kutner, Nachtsheim, & Neter, 2004). This diagnostic was performed using the Variance Inflation Factor (VIF), a commonly employed metric that quantifies the extent to which the variance of an estimated regression coefficient is increased due to collinearity.

The results indicated that the VIF values for the explanatory variables ranged from 1.16 to 2.37, with a mean VIF of 1.75. These values are well below the conventional cut-off threshold of 10, beyond which multicollinearity is typically considered problematic (Gujarati & Porter, 2009). The findings, therefore, confirmed that multicollinearity was not a concern in this model, and all selected variables were deemed suitable for inclusion in the subsequent regression analysis.

To analyze the determinants influencing farmers’ choice of coffee marketing channels, a multinomial logistic regression model was employed. In this analysis, private traders were designated as the base category against which comparisons were made for the other two marketing channels: cooperatives and exporters. The

model estimated the relative likelihood of a farmer selecting either cooperatives or exporters over private traders, based on selected socio-economic, institutional, and farm-level factors.

With regard to the cooperative category, several variables emerged as statistically significant predictors of farmers' choice. Specifically, farm size ($p = .002$), coffee yield ($p = .014$), farm location ($p = .024$), level of farm investment ($p < .001$), and the type of technology used in coffee production ($p = .002$) were all positively associated with the likelihood of marketing coffee through cooperatives, compared to private traders. These results suggest that larger and more productive farms, particularly those located in advantageous areas and characterized by higher levels of investment and modern production technologies, are more inclined to engage with cooperative marketing channels.

Similarly, when evaluating the exporters' category, the analysis revealed that farm size ($p < .001$), coffee yield ($p < .001$), farm location ($p = .002$), level of farm investment ($p = .004$), and technology adoption in coffee production ($p = .002$) were also statistically significant. This indicates that farmers with larger landholdings, higher yields, better geographical positioning, greater financial investment in their farms, and enhanced technological uptake are more likely to sell their produce through exporters rather than private traders. These findings underscore the role of resource endowment and production efficiency in shaping market participation decisions among smallholder coffee farmers.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

This chapter synthesizes the key findings of the study and presents the corresponding conclusions in relation to the stated research objectives. It further offers practical and policy-oriented recommendations aimed at enhancing the effectiveness of coffee marketing strategies in the study area. Additionally, the section includes pertinent areas for further research that could extend the scope of the current study and contribute to a more comprehensive understanding of the dynamics influencing smallholder farmers' choice of coffee marketing channels.

5.1 Conclusion

This study set out to investigate the factors influencing smallholder farmers' choice of coffee marketing channels in the context of Uganda's dynamic agricultural economy. By employing a multinomial logistic regression model, the research provided a robust empirical framework through which socio-demographic, institutional, and farm-level variables were systematically analysed. The results reveal that farmers' decisions are neither random nor homogeneous but are shaped by a constellation of interrelated factors, including human capital, resource endowment, and access to enabling institutional infrastructure.

Accordingly, it is be concluded that;

Key social- economic characteristic that; higher educational attainment, more years of farming experience, greater household income, and access to off-farm income significantly increase the likelihood of engaging with exporters or private traders instead of cooperatives. These outcomes highlight the critical role of human capital and income diversification in shaping farmers' orientation toward more commercial or flexible market channels.

Additionally, institutional variables such as access to; credit, extension services, and market information were shown to exert significant influence in choosing the private and or exporter market channels over the cooperative channel affirming the foundational importance of support services in facilitating market participation and enhancing decision-making. However,despite access to credit and extension

services, membership to the cooperative influenced farmers' choices for cooperative channel against the private and or exporter market channels.

While at the farm level, indicators of resource endowment—such as farm size, yield performance, and technological adoption—were closely associated with participation in more formal marketing arrangements, including cooperatives and exporters. This pattern suggests a dualistic marketing system in which better-resourced farmers align with structured and potentially more lucrative channels, while those with fewer resources tend to rely on informal private traders. This differentiation underscores structural inequalities in the coffee value chain, with implications for inclusive market development and equitable growth.

The study also contributes to existing literature by reinforcing the interplay between individual attributes and systemic conditions in shaping marketing behavior. It also confirms the presence of a stratified marketing environment where institutional access and farm capacity dictate the extent and quality of market engagement. No contradictory evidence was observed, enhancing the internal consistency and validity of the research findings.

5.2 Recommendations

Drawing from the study findings, which demonstrated the significant influence of socio-demographic, institutional, and farm-level characteristics on farmers' marketing decisions, the following practical and policy recommendations are proposed for stakeholders including policymakers, development agencies, farmer organizations, and agricultural service providers.

In reference to objective one of this study based on which the influence of social-economic characteristics of coffee farmers on farmers' choice of given market channel, it is fundamental to;

5.2.1 Promote Adult Education and Farmer Literacy Programs

The level of education was found to significantly influence farmers' choice of both private trader and exporter marketing channels. It is recommended that the Ministry of Education and Sports, in collaboration with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and development partners, establish targeted adult

education programs that enhance literacy, numeracy, and agribusiness skills among smallholder farmers. Emphasis should be placed on market literacy, financial literacy, and the use of digital tools for marketing.

While in regard to objective two of this study based on which the influence of institutional factors on farmers' choice of market channel was examined, the following is recommended for attention by value chain developers in the coffee industry.

5.2.2 Enhance Access to Affordable Credit Facilities

Access to credit emerged as a statistically significant factor influencing participation in both private trader and exporter channels. The Government of Uganda, through MAAIF, should expand rural financial inclusion initiatives by strengthening SACCOs, partnering with microfinance institutions, and promoting credit guarantee schemes with support from institutions such as the Uganda Development Bank (UDB). Tailored loan products for coffee farmers should be designed with flexible repayment terms and minimal collateral requirements.

5.2.3 Expand and Improve Agricultural Extension Services

Access to extension services significantly influenced farmers' engagement with exporter channels. District Agricultural Offices, under the guidance of MAAIF, should prioritize recruitment, training, and deployment of well-equipped extension officers. Efforts should also focus on integrating ICT-based extension platforms to complement traditional methods and ensure timely delivery of agronomic and market advisory services.

5.2.4 Strengthen Market Information Systems

Market information significantly influenced farmers' decisions to engage with private traders. It is recommended that MAAIF revamp the National Agricultural Market Information System (NAMIS) to ensure regular, accurate, and accessible dissemination of coffee prices, demand forecasts, and buyer networks. Collaboration with telecommunications companies could enhance the use of SMS and mobile applications for real-time market updates.

5.2.5 Improve Rural Infrastructure and Market Access

Given the influence of market proximity on marketing channel choice, the Ministry of Works and Transport, together with local governments, should prioritize investment in rural infrastructure development. Construction and rehabilitation of feeder roads will reduce transaction costs and increase farmers' access to lucrative marketing channels such as exporters and cooperatives.

5.2.6 Support Cooperative Development and Group Marketing

Cooperative membership significantly shaped farmers' participation in both private trader and exporter channels. The Uganda Cooperative Alliance (UCA) and MAAIF, with support from donors such as IFAD and USAID, should enhance the capacity of coffee cooperatives through training, governance support, and access to value addition infrastructure. Collective marketing should be promoted as a strategy for improving bargaining power and price realization.

In reference to objective three of this study based on which the influence of farm level characteristics on farmers' choice of market channel was examined, it is recommended as below for attention by value chain developers in the coffee industry.

5.2.7 Encourage Farm Investment and Technology Adoption

Findings showed that larger farm size, higher yields, and use of modern technologies significantly influenced participation in more profitable marketing channels. It is recommended that MAAIF and research institutions such as NARO intensify support for improved coffee varieties, irrigation technologies, and sustainable production systems. Input subsidy programs and mechanization support should also be tailored to incentivize productivity-enhancing investments.

5.3 Further Research Recommendations

While the study addressed its primary objectives, it also unveiled several research gaps and future directions that warrant academic exploration.

5.3.1 Conduct Longitudinal Studies on Marketing Behavior

This study applied a cross-sectional design, which limits the understanding of how marketing channel decisions evolve over time. Future studies should adopt longitudinal approaches to assess temporal changes in farmers' market participation, especially in response to policy shifts or climate variability.

5.3.2 Examine Gender Dynamics in Coffee Marketing

Gender was not a focal variable in this study, yet existing literature suggests that gender roles influence access to resources and markets. Future research should disaggregate data by gender to investigate how male and female farmers differ in marketing channel preferences and outcomes.

5.3.3 Investigate the Role of Digital Innovations in Coffee Marketing

With the increasing penetration of mobile phones and e-commerce platforms, there is a need to examine how digital technologies are transforming the coffee marketing landscape. Research should assess adoption levels, barriers, and impacts of digital marketing platforms on farmer incomes and decision-making.

5.3.4 Adopt Mixed Methods for Comprehensive Insights

The current study employed a quantitative approach. Future studies should consider mixed methods designs that incorporate qualitative techniques such as interviews and focus group discussions. This would enrich understanding of contextual, social, and behavioral factors underlying marketing choices.

5.3.5 Comparative Regional Studies

The study was confined to a specific geographical area. Comparative research across different agro-ecological zones or coffee-growing regions would be valuable for identifying regional disparities and designing context-specific marketing interventions.

5.3.6 Assess the Income and Welfare Impacts of Marketing Channels

Further econometric studies should be undertaken to assess how participation in different marketing channels affects household incomes, food security, and overall welfare. Such impact assessments would be vital for policy prioritization and scaling up successful marketing models.

5.4 Final Remarks

The findings of this study underscore the multifaceted nature of marketing channel decisions among smallholder coffee farmers. Through rigorous statistical analyses, the study demonstrated that socio-demographic attributes, institutional access, and farm-level characteristics all significantly influence marketing behavior. It is anticipated that the recommendations derived herein will contribute meaningfully to the development of inclusive, efficient, and farmer-centered marketing systems. Ultimately, the study aspires to inform policies and practices that enhance the livelihoods of smallholder farmers and promote sustainable agricultural commercialization in Uganda.

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UGANDA CHRISTIAN UNIVERSITY
A Centre of Excellence in the Heart of Africa

DIRECTORATE OF POSTGRADUATE STUDIES DISSERTATION CORRECTION COMPLIANCE FORM (POST VIVA FORM)

Date: 6th September,2025

Name of Candidate: BWAYO ISAAC NOEL Reg. No **S19M20 /002**

Title of Dissertation: Analyzing determinants of farmers' choice of coffee marketing channels in Bugisu Sub-region. (a case study of Mbale District, Uganda)

S/N	**Combined comments by; External Examiner, Internal Examiner & suggestions by Viva voce Panel**	**Action taken**	**Indicator**
1.	Summarize key pieces of information as the abstract on one page.	Key information has been summarized on one page	Page iv
2.	Narrow down to three objectives and three research questions instead of four.	Specific objectives and research questions were reduced to three in regard to the topic of study.	Page 4
3.	Explain the theory, Planned Behavior Theory in detail.	This has been explained in detail, relating variables to those in the conceptual framework	Page 16
4.	Ensure that all cited authors are included in the references at the end of the document.	This has been done accordingly using the UCU approved referencing format	Page 65
5.	Align the recommendations to the objectives.	The recommendations have been presented in accordance with the objectives	Page 59 - 62
6.	Cite the original author of the formula that you used to determine the sample size from which the data was got.	Included the original author accordingly.	Page 21
7.	Clearly summarize the effect of categorical variables (social economic factors, institutional factors and farm level	Discussion of results has been improved accordingly	Page 27 - 44

	characteristic) on the farmers' choice of marketing channel		
8.	Ensure that you define key terms in your study especially the dependent and independent variables.	The literature review has been improved to give more insights about the categorical variables	Page 9 - 14

Candidate's Name: BWAYO ISAAC NOEL Signature 

Supervisor's Name: ASS.Prof. KATONO ISAAC Signature