

MAKERERE UNIVERSITY

ADOPTION OF IMPROVED COFFEE POST HARVEST HANDLING PRACTICES IN NAKISUNGA SUB-COUNTY, MUKONO DISTRICT.

BY

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BAGM III

A RESEARCH DISSERTATION SUBMITTED TO THE COLLEGE OF AGRICULTURURAL AND ENVIRONMENTAL SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR AWARD OF A DEGREE OF BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT OF MAKERERE UNIVERSITY

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DECLARATION

I **Byamukama Luke,** declare to the best of my knowledge that this research dissertation is original and has never been submitted to any institution or examination board for an academic award.

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DEDICATION

DEDICATION

I dedicate this research to the Almighty God for His grace and for giving me wisdom and strength to complete this academic journey.

To my beloved parents, Mr and Mrs Tumuhairwe for your endless love, prayers, and sacrifices.

To Mr and Mrs Didas Kayiranga for believing in me, supporting me, and standing with me throughout my studies.

And to the smallholder coffee farmers in Mukono District whose hard work and resilience inspired this study.

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Meaning
FAO	Food and Agriculture Organization of the United Nations
FAQ	Fair Average Quality
GDP	Gross Domestic Product
Kg	Kilogram
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MVP	Multivariate Probit
NGO	Non-Governmental Organization
PDM	Parish Development Model
SPSS	Statistical Package for the Social Sciences
UCDA	Uganda Coffee Development Authority
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings
USAID	United States Agency for International Development

ABSTRACT

Coffee is an important commercial crop and source of household income for many farming households in Uganda. However, the quality and market value of coffee are influenced not only by production practices but also by how coffee is handled after harvesting. This study analysed coffee post-harvest handling practices among farmers in Nakisunga Sub-County, Mukono District. Specifically, the study sought to characterize the post-harvest handling practices used by coffee farmers, establish a typology of farmers based on their post-harvest handling practices, and examine the drivers influencing farmers' choice of post-harvest handling practices. A cross-sectional research design was used, and data were collected from 103 coffee farmers using a structured questionnaire administered electronically through KoboCollect. Descriptive statistics were used to characterize the post-harvest handling practices, while cross-tabulation was used to establish farmer typologies based on combinations of practices. A Multivariate Probit model was used to examine factors influencing the choice of selected post-harvest handling practices.

The findings showed that farmers widely practised harvesting of ripe cherries, sorting and grading, storage and packaging. However, substantial differences were observed in drying practices, with bare-ground drying remaining common while relatively fewer farmers used tarpaulins or raised drying racks. Three farmer typologies were identified: selective adopters, broad adopters and comprehensive adopters, with comprehensive adopters constituting the largest group. Improved drying was the major practice distinguishing the farmer typologies. Farmers identified weather conditions, coffee prices, education, storage facilities, access to credit, farmer-group membership and extension services as important factors influencing their handling decisions. The Multivariate Probit results further indicated that age and distance to the nearest coffee market were associated with the choice of improved drying practices. The study concludes that although farmers in Nakisunga Sub-County have adopted several post-harvest handling practices, important gaps remain in improved drying. The study recommends strengthening practical extension services, improving access to drying and storage facilities, promoting collective action through farmer groups, and strengthening quality-based market incentives for coffee farmers.

Keywords: Coffee, post-harvest handling, coffee farmers, drying practices, farmer typology, technology adoption, Multivariate Probit, Nakisunga Sub-County.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Coffee (*Coffea spp.*) is one of the most important agricultural commodities in the world and plays a significant role in the economies of many developing countries (International Coffee Organization, 2022). Globally, coffee supports the livelihoods of more than 125 million people through production, processing, transportation, marketing, and export trade (World Bank, 2020). The crop is widely valued because it generates employment opportunities, contributes to foreign exchange earnings, and supports rural development, particularly among smallholder farmers in tropical regions of Africa, Asia, and Latin America (Food and Agriculture Organization, 2019). In recent years, the global coffee industry has increasingly emphasized quality improvement and value addition due to growing demand for premium and specialty coffee in international markets (Ponte, 2019). As a result, attention has shifted beyond production to include post-harvest handling practices, which are now recognized as critical determinants of coffee quality, market competitiveness, and profitability.

In Uganda, coffee is the leading agricultural export commodity and one of the most important sources of income for rural households (Uganda Coffee Development Authority, 2023). The sector contributes substantially to national export earnings and supports approximately 1.7 million households directly involved in coffee farming (UBOS, 2021). Uganda is among the leading coffee producers in Africa, with Robusta coffee accounting for the largest proportion of national production (International Coffee Organization, 2022). Coffee production is concentrated mainly in the Central, Eastern, and Western regions of the country where climatic conditions are favorable for cultivation (MAAIF, 2020). Mukono District, located in the Central Region of Uganda, is one of the major Robusta coffee-producing areas due to its fertile soils, adequate rainfall, and suitable temperatures (UCDA, 2021). For many households in the district, coffee farming serves as the primary source of cash income used to support education, healthcare, food security, and household welfare (UBOS, 2021).

Despite the economic importance of coffee, many farmers continue to experience low returns from coffee farming due to several production and marketing challenges (World Bank, 2020). One of the major factors affecting coffee profitability is the quality of coffee produced, which is highly influenced by post-harvest handling practices (FAO, 2019). Post-harvest handling refers to all activities carried out after harvesting coffee cherries until the product reaches the market or processing stage. These activities include harvesting, sorting, drying, storage, transportation, and packaging (International Coffee Organization, 2021). Proper post-harvest handling helps maintain bean quality, minimize losses, and increase the market value of coffee, while poor handling practices lead to quality deterioration, contamination, and lower prices.

The quality of coffee is determined by several attributes including moisture content, bean size, color, aroma, defect levels, and cup characteristics (Ponte, 2019). These quality attributes are directly influenced by the type of post-harvest handling practices used by farmers. For example, selective harvesting of ripe cherries improves uniformity and enhances flavor quality, while harvesting immature cherries reduces bean quality and negatively affects cup taste (Baffes, 2018). Similarly, drying coffee on raised racks promotes proper air circulation and reduces contamination, whereas drying coffee on bare ground exposes beans to dirt, stones, and uneven drying, which lowers quality (Alemu et al., 2021). Inadequate storage conditions may also lead to moisture absorption, mold growth, and pest infestation, further reducing the marketability of coffee (MAAIF, 2019).

Coffee quality has a direct influence on market prices because buyers and exporters use grading systems to determine the value of coffee beans (International Coffee Organization, 2022). High-quality coffee with low defect levels and appropriate moisture content attracts premium prices in both domestic and international markets, while low-quality coffee is downgraded and sold at lower prices (FAO, 2019). This means that post-harvest handling practices indirectly influence farmers' income through their effect on coffee quality and price determination. Farmers who adopt improved post-harvest handling practices are therefore more likely to access better markets and receive higher prices compared to those using traditional methods (Mugaga et al., 2020).

Although several studies have emphasized the importance of coffee quality and value addition, many smallholder farmers in Uganda continue to rely on traditional post-harvest handling methods

due to limited access to extension services, infrastructure, financial resources, and market information (World Bank, 2020). These farmers often make different choices regarding harvesting, drying, storage, and marketing practices depending on socio-economic, institutional, and farm-related factors. Understanding the factors that drive farmers' choice of post-harvest handling practices is therefore important for designing interventions aimed at improving coffee quality and increasing farmer profitability.

Previous studies in Uganda have largely focused on coffee production, productivity, and marketing, with relatively limited attention given to the drivers influencing farmers' choice of post-harvest handling practices at the local level (UCDA, 2021). Furthermore, the adoption of post-harvest handling practices is often interrelated, meaning that farmers may simultaneously adopt several practices depending on available resources and knowledge. This requires analytical approaches capable of examining multiple adoption decisions jointly. Therefore, this study seeks to analyze coffee post-harvest handling practices among crop farmers in Mukono District, with emphasis on identifying the socio-economic and institutional drivers influencing farmers' choice of post-harvest handling practices.

1.2 PROBLEM STATEMENT

Coffee remains Uganda's leading agricultural export commodity and a major source of income for smallholder farmers, particularly in the Central Region including Mukono District (Uganda Coffee Development Authority, 2023). Despite the importance of coffee in improving rural livelihoods, many farmers continue to experience low profitability and inconsistent returns from coffee farming (World Bank, 2020). One of the major factors contributing to this challenge is poor post-harvest handling, which affects coffee quality, marketability, and ultimately the prices received by farmers (Food and Agriculture Organization, 2019). Post-harvest handling practices such as drying, sorting, storage, and transportation play a critical role in preserving coffee quality and reducing losses. However, many smallholder farmers in Uganda continue to use traditional methods that often result in contamination, high moisture content, mold growth, and increased defect levels, leading to lower coffee grades and reduced prices (MAAIF, 2019).

Although several interventions have focused on increasing coffee production and improving quality standards, relatively limited attention has been given to understanding the factors influencing farmers' choice of post-harvest handling practices at the local level (UCDA, 2021). Farmers often adopt different combinations of handling practices depending on socio-economic characteristics, access to extension services, market conditions, infrastructure, and available resources. However, empirical evidence regarding the drivers influencing these choices among coffee farmers in Mukono District remains inadequate.

1.3 OBJECTIVES OF THE STUDY

General Objective

To assess coffee post-harvest handling practices among farmers in Nakisunga Sub-County, Mukono District.

Specific Objectives

i. To characterize the post-harvest handling practices used by coffee farmers in Nakisunga Sub-County, Mukono District.
ii. To establish a typology of coffee farmers based on post-harvest handling practices in Nakisunga Sub-County, Mukono District.
iii. To understand the key factors that influence farmers' choice of coffee post-harvest handling practices in Nakisunga Sub-County, Mukono District.

1.4 RESEARCH QUESTIONS

i. What post-harvest handling practices are used by coffee farmers in Mukono District?
ii. What are the key factors that influence farmers' choice of coffee post-harvest handling practices in Mukono District?

1.5 JUSTIFICATION AND SIGNIFICANCE OF THE STUDY

The study will provide important information on the different post-harvest handling practices used by coffee farmers in Mukono District and the factors influencing farmers' choice of these practices.

The findings will help policymakers, agricultural extension workers, and development organizations better understand the constraints affecting adoption of improved post-harvest handling practices among smallholder coffee farmers.

The study will also contribute to efforts aimed at improving coffee quality and enhancing farmer profitability. By identifying the drivers influencing farmers' decisions regarding post-harvest handling, stakeholders such as the Uganda Coffee Development Authority and the Ministry of Agriculture Animal Industry and Fisheries will be able to design more targeted interventions, training programs, and policies that promote adoption of improved handling practices.

In addition, the study will contribute to academic knowledge by providing empirical evidence on coffee post-harvest handling practices and farmer typologies in Mukono District. The findings may serve as reference material for future researchers interested in agribusiness management, agricultural value chains, coffee quality management, and rural development.

The study is justified because coffee remains one of the most important cash crops in Uganda, yet many farmers continue to experience quality-related losses and low market returns due to poor post-harvest handling practices (FAO, 2019). Furthermore, existing studies have largely focused on coffee production and marketing, with limited attention given to understanding the socio-economic and institutional factors influencing farmers' choice of post-harvest handling practices at the local level.

CHAPTER TWO

LITERATURE REVIEW

2.1 Importance of Coffee in Uganda and Globally

Coffee (*Coffea spp.*) is one of the most widely traded agricultural commodities in the world and plays a crucial role in the global economy, particularly in developing countries (International Coffee Organization, 2022). It is estimated that over 125 million people worldwide depend on coffee production, processing, and trade for their livelihoods, the majority being smallholder farmers in Africa, Latin America, and Asia (World Bank, 2020). Coffee contributes significantly to employment creation, income generation, and foreign exchange earnings, making it a strategic crop for economic development in many low-income countries (Food and Agriculture Organization, 2019). The global demand for coffee continues to grow due to increasing consumption, especially in emerging markets, further strengthening its economic importance (ICO, 2021).

In Uganda, coffee is the leading agricultural export commodity and a key pillar of the country's economy (Uganda Coffee Development Authority, 2023). The sector contributes substantially to foreign exchange earnings, accounting for a large share of agricultural exports, and plays a vital role in rural development (UCDA, 2022). Approximately 1.7 million households in Uganda are engaged in coffee farming, most of whom are smallholder farmers cultivating less than five acres of land (UBOS, 2021). Coffee production is therefore not only a source of national revenue but also a primary livelihood activity that supports household income, food security, and poverty reduction in rural areas (MAAIF, 2020).

The Central Region of Uganda, including Mukono District, is one of the major coffee-producing areas, particularly for robusta coffee, which constitutes the bulk of Uganda's production (UCDA, 2021). The region benefits from favorable agro-ecological conditions, including fertile soils and adequate rainfall, which support coffee cultivation (MAAIF, 2019). In areas such as Nakisunga Sub-County, coffee farming is deeply integrated into the socio-economic fabric of rural communities, serving as a major source of cash income used to meet household needs such as education, healthcare, and reinvestment in farming activities (UBOS, 2021).

Despite its importance, the potential of coffee to improve farmer livelihoods is often constrained by challenges related to quality management, price fluctuations, and inefficiencies along the value chain (World Bank, 2020). While efforts have been made to increase production, improving the quality and value of coffee remains critical for enhancing farmer incomes and ensuring sustainability of the sector (FAO, 2019). This underscores the need to focus not only on production but also on post-harvest practices that influence the final value of coffee.

2.2 Coffee Value Chain and Value Addition

The coffee value chain consists of a series of interconnected activities that transform coffee from production at the farm level to consumption in domestic and international markets (Trienekens, 2018). The major stages of the coffee value chain include production, post-harvest handling, processing, marketing, and distribution. Each stage contributes to the overall value of the final product, with value being added through improvements in quality, processing, and market access (FAO, 2020). Among these stages, post-harvest handling plays a particularly critical role in determining the quality and marketability of coffee.

Value addition in the coffee sector refers to the enhancement of the economic value of coffee through processes that improve its quality, appearance, and market appeal (Ponte, 2019). In the context of smallholder farming systems, value addition often begins at the post-harvest stage, where activities such as proper harvesting, sorting, drying, and storage significantly influence the final quality of coffee beans. High-quality coffee attracts premium prices in both local and international markets, while poor-quality coffee is often downgraded and sold at lower prices (ICO, 2021). Therefore, the ability of farmers to adopt appropriate post-harvest handling practices is essential for maximizing value addition and income generation.

In Uganda, the coffee value chain is dominated by smallholder farmers who typically sell their produce in the form of kiboko (dried coffee cherries) or partially processed beans to traders and middlemen (UCDA, 2021). However, a significant portion of potential value is often lost at the farm level due to poor post-harvest handling practices such as improper drying, inadequate sorting, and poor storage conditions (MAAIF, 2019). These inefficiencies reduce coffee quality and limit

farmers' ability to access higher-value markets. Studies have shown that improving post-harvest handling practices can significantly enhance coffee quality, reduce losses, and increase farmers' share of the final market price (Barjolle et al., 2017).

Furthermore, the structure of the coffee value chain influences how value is distributed among actors. Farmers who engage in better handling and basic value addition are more likely to receive higher prices compared to those who sell low-quality, unprocessed coffee (World Bank, 2020). This highlights the importance of strengthening post-harvest management as a key strategy for improving value capture at the farm level. Understanding the role of post-harvest handling within the coffee value chain is therefore essential for analyzing how these practices influence coffee quality, pricing, and ultimately farmers' income.

2.3 Post-Harvest Handling Practices in Coffee Production

Post-harvest handling practices in coffee refer to all activities carried out after harvesting coffee cherries until the product is ready for sale or further processing. These practices are critical in maintaining quality, minimizing losses, and enhancing the market value of coffee (Food and Agriculture Organization, 2019). In smallholder systems such as those in Uganda, post-harvest handling is largely done at the farm level, making farmers key determinants of final coffee quality (Uganda Coffee Development Authority, 2021).

2.3.1 Harvesting Practices

Harvesting is the first and one of the most important stages in post-harvest handling. Coffee cherries should ideally be harvested when fully ripe, as ripe cherries contain optimal sugar levels necessary for good flavor development (Ponte, 2019). Two common methods are used:

- **Selective picking** – harvesting only ripe cherries
- **Strip picking** – removing all cherries regardless of ripeness

Selective picking is recommended because it ensures uniformity in processing and improves final quality, while strip picking often results in mixing ripe and unripe cherries, leading to poor quality and lower prices (Baffes, 2018).

2.3.2 Sorting and Grading

After harvesting, cherries are sorted to remove unripe, overripe, and defective fruits. Sorting can be done manually or through flotation methods where defective cherries float and are removed (FAO, 2019). Proper sorting ensures uniformity, reduces defects, and improves overall bean quality, which is critical for grading and pricing.

2.3.3 Drying Methods

Drying is a crucial stage that determines moisture content and prevents spoilage. The main drying methods include drying on bare ground, drying on tarpaulins and drying on raised racks. Drying on bare ground is common among smallholders but exposes coffee to contamination and uneven drying. In contrast, raised drying racks promote better air circulation, reduce contamination, and produce higher quality beans (Beyene et al., 2020). Proper drying should reduce moisture content to about 10–12%, which is ideal for safe storage (ICO, 2021).

2.3.4 Storage Practices

After drying, coffee is stored before sale. Proper storage involves keeping coffee in well-ventilated, dry conditions using clean bags (e.g., jute bags) placed on raised platforms (MAAIF, 2019). Poor storage conditions, such as damp environments or direct contact with the floor, can lead to mold growth, pest infestation, and quality deterioration.

2.3.5 Transportation and Marketing

Transportation methods and conditions also influence coffee quality. Poor handling during transportation may cause physical damage to beans or contamination (FAO, 2020). Farmers typically sell coffee to middlemen, cooperatives, or processors, often in the form of kiboko or partially processed beans (UCDA, 2021).

Illustration of Coffee Post-Harvest Handling Process

Harvesting → Sorting → Drying → Storage → Transportation → Marketing

↓ ↓ ↓ ↓ ↓

Quality Control	Defect Removal	Moisture Control	Preservation of Quality	Final Price Determination

This sequence shows that each stage contributes cumulatively to the final quality and value of coffee.

2.4 Effect of Post-Harvest Handling Practices on Coffee Quality

Coffee quality is a key determinant of its market value and is highly influenced by post-harvest handling practices (International Coffee Organization, 2021). Quality refers to the physical and sensory attributes of coffee, including bean size, color, moisture content, defect levels, and cup characteristics such as aroma and taste (Ponte, 2019). Poor handling at any stage can compromise these attributes and reduce the overall quality of coffee.

2.4.1 Influence of Harvesting Practices on Quality

Harvesting methods directly affect the uniformity and chemical composition of coffee beans. Ripe cherries produce beans with better flavor and aroma, while unripe or overripe cherries result in undesirable tastes and defects (Baffes, 2018). Mixing cherries of different maturity levels leads to inconsistent processing and reduced overall quality.

2.4.2 Influence of Drying Practices on Quality

Drying plays a critical role in preserving coffee quality. Improper drying, such as drying on bare ground, can lead to contamination with soil, stones, and foreign materials (Beyene et al., 2020). Inadequate drying may result in high moisture content, which promotes mold growth and fermentation, leading to off-flavors and spoilage (Alemu et al., 2021). Conversely, proper drying ensures uniform moisture levels and maintains bean integrity.

2.4.3 Influence of Storage Practices on Quality

Storage conditions significantly affect the shelf life and quality of coffee. Exposure to moisture, heat, and poor ventilation can cause deterioration, including discoloration, odor development, and

fungal contamination (FAO, 2019). Proper storage helps preserve quality until the coffee is sold or processed.

2.4.4 Defects and Quality Deterioration

Poor post-harvest handling leads to various defects such as broken beans, insect damage, moldy beans, and discoloration. These defects are used in grading systems to determine quality levels (ICO, 2021). Higher defect counts result in lower grades and reduced prices.

Illustration of Relationship Between Handling Practices and Quality

Poor Practices		Good Practices
Unripe harvesting		Selective harvesting
Drying on bare ground	→	Drying on raised racks
Poor storage conditions		Proper storage facilities
↓		↓
High defects, contamination		Low defects, clean beans
High moisture content		Optimal moisture content
↓		↓
Low Quality		High Quality

This clearly demonstrates that post-harvest handling practices directly determine coffee quality, which in turn influences grading and pricing.

Overall, post-harvest handling practices are critical determinants of coffee quality. Proper handling enhances quality and market value, while poor handling leads to quality deterioration and economic losses. This underscores the importance of improving post-harvest practices among smallholder farmers to enhance both quality and income.

2.5 Determinants of Coffee Quality

Coffee quality is influenced by a combination of factors that occur both before and after harvest, although post-harvest practices play a particularly critical role. One of the key determinants of

quality is the level of ripeness at harvesting, as fully ripe cherries contain optimal sugar and chemical composition necessary for desirable flavor and aroma (Baffes, 2018). Harvesting immature or overripe cherries leads to inconsistencies in processing and results in poor cup quality. In addition, the method of harvesting, whether selective picking or strip picking, significantly affects uniformity, which is essential for maintaining consistent quality (Ponte, 2019).

Drying conditions are another major determinant of coffee quality. Proper drying ensures that coffee reaches the recommended moisture content of about 10–12%, which is essential for preserving quality during storage (International Coffee Organization, 2021). Inadequate or uneven drying can lead to high moisture content, which promotes mold growth, fermentation, and the development of off-flavors (Alemu et al., 2021). Similarly, environmental factors such as temperature, humidity, and exposure to contaminants during drying can affect the physical and sensory attributes of coffee beans (FAO, 2019).

Storage conditions further influence coffee quality by affecting the stability and preservation of dried beans. Poor storage practices, such as storing coffee in humid or poorly ventilated environments, can result in fungal contamination, pest infestation, and deterioration in color and aroma (MAAIF, 2019). On the other hand, proper storage in dry, well-ventilated conditions helps maintain bean quality over time. Other determinants of quality include handling during transportation, which may cause physical damage, and adherence to recommended processing standards, all of which contribute to the final grade and marketability of coffee (UCDA, 2021).

2.6 Effect of Coffee Quality on Market Prices

Coffee quality is a primary determinant of its market price in both domestic and international markets. Coffee is graded based on several quality attributes, including bean size, moisture content, defect count, and cup characteristics such as aroma, flavor, and acidity (International Coffee Organization, 2022). Higher-quality coffee that meets established standards attracts premium prices, while lower-quality coffee is downgraded and sold at significantly reduced prices (Ponte, 2019). This grading system creates a direct link between quality and income, as farmers who produce better-quality coffee are able to access more lucrative markets.

Defects in coffee, such as broken beans, mold contamination, and discoloration, are key factors that reduce quality and lower prices. High defect counts lead to lower grades, which directly translate into price penalties in the market (FAO, 2019). Additionally, coffee with high moisture content is often rejected or sold at discounted prices due to the risk of spoilage and reduced shelf life (Alemu et al., 2021). In contrast, properly dried and well-handled coffee with minimal defects commands higher prices because it meets the requirements of exporters and specialty buyers.

Market dynamics also reinforce the importance of quality in price determination. Buyers, including exporters and processors, are willing to pay premium prices for coffee that meets quality standards required in international markets (World Bank, 2020). Specialty coffee markets, in particular, offer significantly higher prices for high-quality beans with desirable sensory attributes (ICO, 2021). Therefore, improving coffee quality is essential for enhancing farmers' bargaining power and increasing their share of the final market value.

2.7 Influence of Post-Harvest Handling Practices on Coffee Prices

Post-harvest handling practices have a direct and significant influence on the prices that farmers receive for their coffee. Since these practices determine coffee quality, they indirectly affect pricing through grading systems used in the market (FAO, 2019). For instance, proper harvesting of ripe cherries, careful sorting, and effective drying reduce defects and improve bean uniformity, leading to higher quality grades and better prices (UCDA, 2021). Conversely, poor handling practices such as mixing ripe and unripe cherries, drying coffee on bare ground, and storing coffee under poor conditions lead to quality deterioration and lower prices.

Drying practices, in particular, have a strong influence on price outcomes. Coffee that is properly dried to the recommended moisture content is more stable, has a longer shelf life, and is more attractive to buyers, resulting in higher prices (International Coffee Organization, 2021). In contrast, coffee with high moisture content is often penalized due to the risk of spoilage and reduced quality, leading to lower market prices (Alemu et al., 2021). Similarly, poor storage practices can result in mold contamination and unpleasant odors, which further reduce the value of coffee in the market (MAAIF, 2019).

Empirical studies indicate that farmers who adopt improved post-harvest handling practices are able to secure better prices compared to those using traditional methods (Mugaga et al., 2020). This is because improved practices enhance quality and enable farmers to access higher-value markets, including export and specialty markets. Therefore, post-harvest handling practices are not only important for maintaining quality but also play a crucial role in determining the economic returns from coffee production. This establishes a clear linkage between handling practices, quality, and pricing, which ultimately affects farmers' income.

2.8 Coffee Marketing Systems and Price Determination

Coffee marketing systems in Uganda consist of a network of actors and channels through which coffee moves from farmers to final consumers. These include farmers, village traders, processors, cooperatives, exporters, and international buyers (Uganda Coffee Development Authority, 2021). Smallholder farmers, who dominate coffee production, typically sell their produce at the farm gate in the form of kiboko (dried coffee cherries) or partially processed beans to local traders or middlemen. In some cases, farmers may sell through cooperatives or farmer groups, which can offer better bargaining power and access to higher-value markets (MAAIF, 2020).

The structure of the marketing system significantly influences the prices received by farmers. Farmers who sell individually to middlemen often have limited bargaining power and may accept lower prices due to lack of market information, urgent cash needs, or limited access to alternative buyers (World Bank, 2020). In contrast, farmers who are organized in cooperatives or producer groups are better positioned to negotiate prices, aggregate produce, and access premium markets, including export markets (Barjolle et al., 2017). This highlights the importance of market organization in determining income outcomes.

Price determination in the coffee market is influenced by both global and local factors. Globally, coffee prices are determined by supply and demand dynamics in international markets, particularly major trading platforms such as the New York and London coffee exchanges (ICO, 2022). However, at the farm level, prices are largely determined by the quality of coffee, which is assessed based on grading standards (Ponte, 2019). Other factors influencing price include transportation costs, distance to market, availability of buyers, and access to market information (FAO, 2020).

Seasonal variations and price fluctuations also affect the income farmers receive, as prices tend to vary depending on supply levels during peak and off-peak seasons (UCDA, 2021).

Furthermore, the level of value addition undertaken by farmers' influences price outcomes. Farmers who sell raw or minimally processed coffee often receive lower prices compared to those who engage in improved post-harvest handling and basic processing (MAAIF, 2019). Therefore, the marketing system and pricing mechanisms are closely linked to the quality of coffee and the level of value addition achieved at the farm level.

2.9 Income from Coffee and Influencing Factors

Income from coffee is a critical component of rural livelihoods in Uganda, particularly for smallholder farmers who depend on coffee as a primary source of cash income (UBOS, 2021). The income earned from coffee is influenced by a combination of factors, including production levels, quality of coffee, market prices, and access to markets (World Bank, 2020). Among these, both quantity and quality play key roles, as income is determined by the volume of coffee sold and the price received per unit.

Production-related factors such as farm size, yield per acre, access to improved planting materials, and farming practices significantly influence the quantity of coffee produced (MAAIF, 2020). However, even when production levels are high, income may remain low if the quality of coffee is poor or if farmers sell their produce at unfavorable prices (FAO, 2019). This highlights the importance of quality management and market access in determining income outcomes.

Socio-economic factors also play a role in influencing income from coffee. These include farmers' level of education, access to extension services, membership in farmer groups, and access to credit (Nakasone et al., 2018). Farmers with better access to information and resources are more likely to adopt improved practices, enhance quality, and access better markets, thereby increasing their income. Additionally, market-related factors such as price volatility, presence of intermediaries, and bargaining power affect the share of value that farmers receive (Ponte, 2019).

Post-harvest losses further reduce income by decreasing the quantity and quality of coffee available for sale. Losses due to poor drying, storage, and handling can significantly reduce the

effective output and lead to financial losses for farmers (MAAIF, 2019). Therefore, improving post-harvest practices is essential not only for maintaining quality but also for maximizing income from coffee production.

2.10 Relationship Between Post-Harvest Handling Practices and Farmers' Income

The relationship between post-harvest handling practices and farmers' income is mediated through coffee quality and market prices. Post-harvest practices such as harvesting, sorting, drying, and storage directly influence the physical and sensory attributes of coffee, which determine its grade and market value (International Coffee Organization, 2021). High-quality coffee attracts premium prices, while poor-quality coffee is downgraded and sold at lower prices, resulting in reduced income for farmers (FAO, 2019).

Empirical studies have demonstrated that farmers who adopt improved post-harvest handling practices tend to earn higher incomes compared to those using traditional methods (Mugaga et al., 2020). For instance, proper drying techniques reduce moisture content and prevent mold formation, leading to better quality beans and higher prices. Similarly, selective harvesting of ripe cherries improves uniformity and enhances cup quality, which is rewarded in the market (Baffes, 2018). In contrast, poor practices such as drying on bare ground, mixing cherries of different maturity levels, and inadequate storage result in quality defects and price penalties (Alemu et al., 2021).

The relationship between post-harvest practices and income is also influenced by the ability of farmers to access markets that reward quality. Farmers who produce high-quality coffee but lack access to premium markets may still receive low prices, highlighting the importance of market linkages in translating quality improvements into income gains (World Bank, 2020). Nevertheless, improving post-harvest handling remains a critical step in enhancing value addition and increasing farmers' share of the final price.

Despite the recognized importance of post-harvest handling, many smallholder farmers in Uganda continue to rely on traditional practices that limit their ability to produce high-quality coffee (MAAIF, 2019). Moreover, while existing studies have explored the effects of post-harvest handling on quality and price, fewer studies have explicitly examined how these practices translate

into income outcomes at the local level. This gap underscores the need for empirical research to analyze the direct relationship between post-harvest handling practices and farmers' income, particularly in specific contexts such as Nakisunga Sub-County, Mukono District.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The study was conducted in Nakisunga Sub-County located in Mukono District in the Central Region of Uganda. Mukono District lies approximately 21 kilometers east of Kampala along the Kampala–Jinja highway. Mukono district is situated between latitude 0°21′N and 0°45′N and longitude 32°35′E and 32°55′E (UBOS, 2021). Nakisunga Sub-County falls within these geographical coordinates and is predominantly rural with agriculture as the main economic activity.

The area experiences a tropical climate with bimodal rainfall ranging between 1,200 mm and 1,500 mm annually, and average temperatures between 16°C and 28°C, conditions that favor robusta coffee production (MAAIF, 2019). According to the Uganda Bureau of Statistics, the majority of households in Mukono District depend on subsistence and semi-commercial agriculture for their livelihood (UBOS, 2021). Coffee is one of the leading cash crops grown in the district and serves as a major source of household income (Uganda Coffee Development Authority, 2023). However, smallholder farmers commonly use traditional post-harvest handling methods, which may negatively influence coffee quality and income outcomes. Nakisunga Sub-County was therefore selected because of its active engagement in coffee production and its relevance to the study objectives.

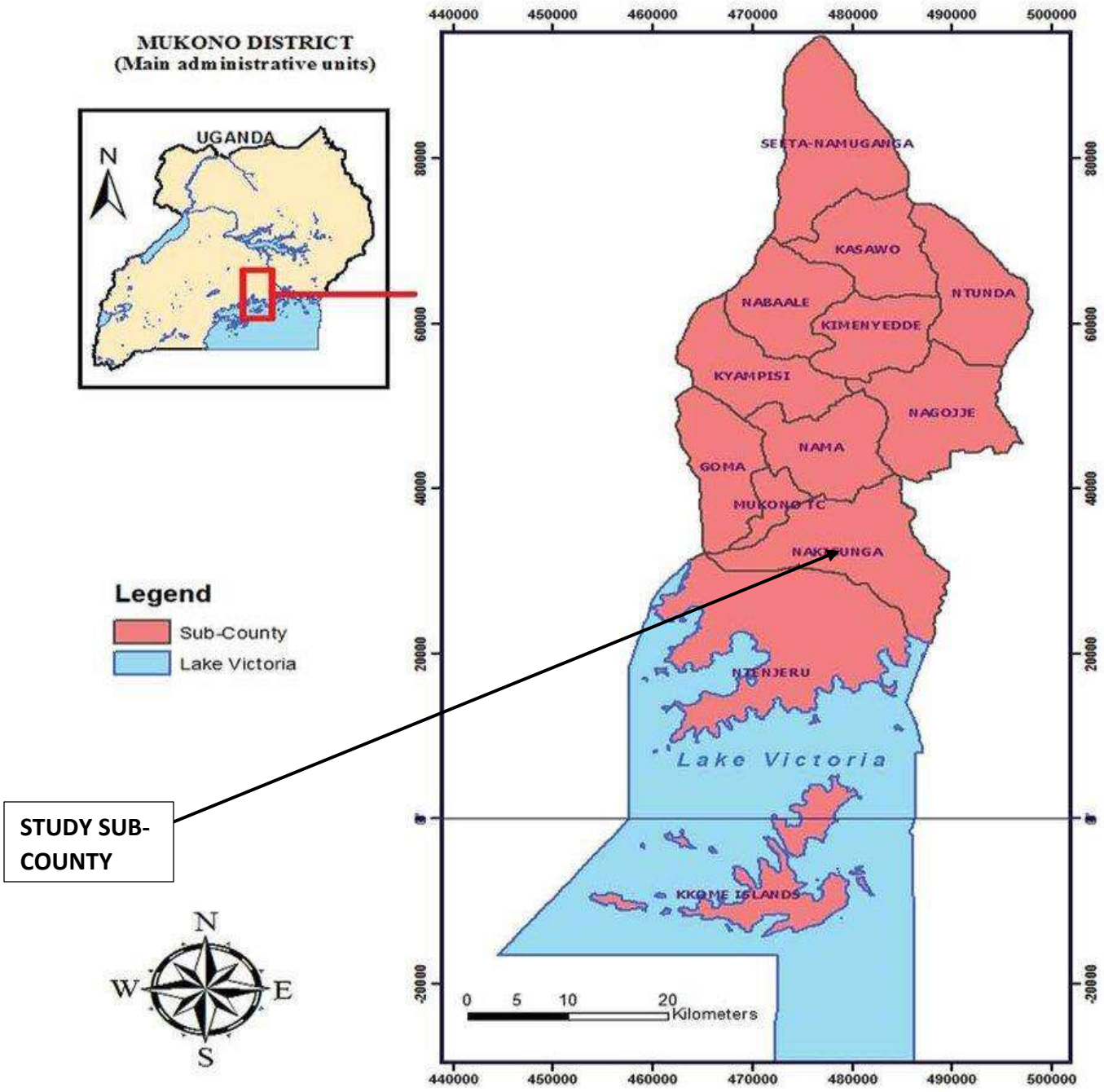


Figure 1: Map of Mukono district showing the Nakisunga sub-county (the study area)

3.2 Target Population

The target population for this study comprised of households involved in coffee production and post-harvest handling activities in Mukono District, Central Uganda. The study specifically

focussed on smallholder coffee farmers because they constitute the majority of coffee producers in the district and are the main actors involved in on-farm post-harvest handling practices such as harvesting, sorting, drying, storage, and transportation of coffee (Uganda Coffee Development Authority, 2021). Smallholder farmers are particularly important in the coffee value chain because the quality of coffee produced at household level is highly influenced by the handling practices they adopt after harvesting (Food and Agriculture Organization, 2019).

The study population included farmers who actively engage in coffee farming and undertake at least one post-harvest handling activity. Farmers who have grown coffee for at least one production season will be considered eligible for inclusion in the study because they are expected to possess practical experience regarding post-harvest handling practices and the factors influencing their choices. The unit of analysis therefore was the individual coffee-farming household.

The target population consisted of farmers using different post-harvest handling methods and technologies. These may include traditional methods such as drying coffee on bare ground as well as improved methods such as drying on tarpaulins or raised drying racks. The study will also consider farmers with varying socio-economic characteristics including differences in age, education level, farm size, farming experience, access to extension services, and market participation, since such factors are likely to influence farmers' choice of post-harvest handling practices (Nakasone et al., 2018).

The study further involved both male and female coffee farmers because gender plays an important role in agricultural decision-making and adoption of agricultural technologies in rural households (World Bank, 2020). Including different categories of farmers enabled the study to obtain comprehensive information regarding the various post-harvest handling practices used and the factors influencing farmers' decisions in Mukono District.

3.3 Research Design

The study employed a cross-sectional research design involving the collection of quantitative data from coffee farmers at a single point in time. A cross-sectional design is considered appropriate because it enables the researcher to obtain information from a relatively large number of respondents within a short period and at relatively low cost (Kothari, 2019). The design is widely

used in agricultural and socio-economic studies because it allows analysis of relationships between variables such as farmer characteristics, institutional factors, and adoption of agricultural practices (Creswell, 2018).

The study adopted a quantitative research approach because the objectives require numerical analysis of farmers' post-harvest handling practices, farmer typologies, and factors influencing the choice of post-harvest handling practices. Quantitative methods are suitable for generating measurable data that can be statistically analyzed to establish patterns, relationships, and differences among respondents (Saunders et al., 2019). The approach also facilitated the use of descriptive statistics, cross-tabulations, typology construction, and econometric modeling techniques such as the Multivariate Probit (MVP) model.

Under the first objective, descriptive statistics such as frequencies, percentages, means, and standard deviations were used to characterize the post-harvest handling practices used by coffee farmers in Mukono District. Descriptive analysis is useful in summarizing and presenting data in a meaningful way that enhances interpretation of respondents' characteristics and farming practices (Mugenda & Mugenda, 2018). The study examined practices related to harvesting, sorting, drying, storage, and transportation of coffee.

For the second objective, cross-tabulation analysis was employed to establish typologies of coffee farmers based on the post-harvest handling practices they use. Cross-tabulation is useful in comparing categories of variables and identifying patterns among groups of respondents (Field, 2018). Through this approach, farmers were grouped according to similarities in handling practices, allowing the study to identify different categories or typologies of coffee farmers in the study area.

The third objective employed the Multivariate Probit (MVP) model to analyze the drivers influencing farmers' choice of post-harvest handling practices. The MVP model is appropriate because farmers often adopt multiple post-harvest handling practices simultaneously rather than independently (Greene, 2018). The model allows estimation of several correlated binary decisions at the same time while accounting for possible interdependence among the different post-harvest

handling choices. This makes the model more suitable than separate binary regression models when analyzing adoption decisions involving multiple practices.

The explanatory variables included in the MVP model were selected based on literature review, theoretical relevance, and findings from previous empirical studies on agricultural technology adoption and post-harvest management (Nakasone et al., 2018; World Bank, 2020). These variables included age of household head, gender, education level, household size, farming experience, farm size, access to extension services, access to credit, market access, membership in farmer groups, distance to markets, and income level. Such variables are considered important because they influence farmers' access to information, financial resources, labor availability, and decision-making capacity regarding adoption of improved agricultural practices (FAO, 2019).

3.4 Sample Size Determination and Sampling technique

The sample size for this study was determined using Yamane's (1967) formula for finite populations, which is widely applied in social science and agribusiness research to obtain representative samples. The formula is expressed as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- n = sample size
- N= total population of smallholder coffee farmers in Nakisunga Sub-County (1,200, UBOS, 2021)
- e = margin of error or level of precision

According to estimates from the Uganda Bureau of Statistics, Nakisunga Sub-County has approximately 1,200 smallholder coffee farmers engaged in coffee production (UBOS, 2021). Using a margin of error of 9% (0.09), which is acceptable for descriptive and analytical studies of this nature (Kothari, 2018), the sample size is calculated as follows:

$$n = \frac{1200}{1+1200(0.09)^2} = \frac{1200}{13} \approx 112$$

Therefore, the study used a sample size of 103 smallholder coffee farmers. This sample size was statistically adequate for generating reliable findings while remaining manageable within the time and resource constraints of an undergraduate research project (Creswell & Creswell, 2018).

A stratified random sampling technique was employed to select the respondents. The villages in Nakisunga Sub-County served as strata to ensure proportional representation across the sub-county. Proportional allocation improves representativeness and reduces sampling bias (Kothari, 2018). The number of farmers selected from each village corresponded to the proportion of coffee farmers in that village relative to the total population. Within each stratum, respondents were selected using simple random sampling, where farmers' lists obtained from local leaders and agricultural extension officers were used as sampling frames. Random selection was conducted using a method called Computer-generated random numbers. This combined approach enhanced fairness, representativeness, and reliability of the study findings regarding the impact of post-harvest handling practices on farmers' income in Nakisunga Sub-County.

3.5 Data Collection

Primary data for this study was collected using a structured questionnaire administered digitally through Kobo Collect software. Kobo Collect is a mobile data collection application that allows researchers to design electronic questionnaires, collect data using smartphones or tablets, and upload responses to a secure server for storage and analysis. The use of digital data collection tools improved data accuracy, reduced entry errors, enhanced completeness through built-in validation checks, and minimized time and costs associated with paper-based surveys (Creswell & Creswell, 2018). Digital data collection platforms are widely recommended in field-based agricultural and socio-economic research because they improve efficiency, data security, and real-time monitoring of responses (World Bank, 2020).

The questionnaire was designed in line with the study objectives and will contain mainly closed-ended questions to facilitate quantitative analysis. It captured information on farmers' socio-economic characteristics, including age, gender, education level, household size, farming experience, land size under coffee, and access to extension services. It will also collect detailed information on post-harvest handling practices such as harvesting methods, sorting procedures,

drying techniques, drying duration, moisture control practices, storage facilities, packaging materials, and marketing channels. In addition, the questionnaire will gather data on quantities harvested, quantities sold, selling prices, production costs related to post-harvest handling, and income earned from coffee sales. This structured format ensures consistency in responses and enhances reliability of the data collected (Kothari, 2018).

3.6 Data Analysis and Presentation

Data collected from the field using KoboCollect software were checked for completeness, consistency, and accuracy before analysis. The collected data were then exported from KoboCollect into Microsoft Excel for cleaning and coding, and thereafter transferred to Statistical Package for Social Sciences (SPSS) version 26 and STATA software for statistical analysis. Data cleaning involved checking for missing values, duplicate responses, outliers, and entry errors to improve reliability and accuracy of the findings (Mugenda & Mugenda, 2018). Coding of variables was also conducted to facilitate quantitative analysis and interpretation of results.

The analyzed data were presented using tables, charts, graphs, and explanatory narratives to enhance interpretation and discussion of findings. Presentation of results in tabular and graphical forms simplified complex information and improve clarity for readers (Saunders et al., 2019). The discussion of findings was guided by the study objectives and supported by relevant literature from previous studies.

3.7 Ethical consideration

This study adhered to established ethical principles governing social science and agricultural research. Prior to data collection, the researcher sought an introductory letter from Makerere University to present to local authorities in Nakisunga Sub-County, Mukono District. Permission was obtained from relevant local leaders to ensure that the study is conducted with transparency and community approval. Ethical clearance procedures followed National Council for Science and Technology (NCST) research guidelines to ensure compliance with accepted research standards (Creswell & Creswell, 2018).

Participation in the study was entirely voluntary. Respondents were informed about the purpose of the study, what their participation involves, and their right to withdraw at any time without penalty. Informed consent was obtained before administering the questionnaire through KoboCollect. The researcher clearly explained that the information collected would be used strictly for academic purposes. Confidentiality and anonymity was strictly maintained. Respondents' names were not recorded in the questionnaire; instead, identification codes will be used. All digital data collected through KoboCollect will be securely stored in password-protected devices accessible only to the researcher.

CHAPTER FOUR;

RESULTS OF THE STUDY

4.1 DEMOGRAPHIC INFORMATION

The respondents were predominantly male (73.8%), while females accounted for 26.2%. The largest age group was 51–60 years (31.1%), followed by 41–50 years (24.3%) and 61 years and above (22.3%). Respondents aged 31–40 years accounted for 17.5%, while those aged 18–30 years were the least represented at 4.9%. Most respondents were married (65.0%). In terms of education, secondary education was the most common level (40.8%), followed by primary education (34.0%) and tertiary education (15.5%); 9.7% did not provide an education response. The mean age was 52.3 years, while the mean household size was 5.9 members.

Table 1: Socio-demographic characteristics of the respondents

Parameter	Variable	Freq. (n=103)	Percent (%)
Sex	Male	76	73.8
	Female	27	26.2
Age	18–30	5	4.9
	31–40	18	17.5
	41–50	25	24.3
	51–60	32	31.1
	61+	23	22.3
Marital status	Single	13	12.6
	Married	67	65.0
	Divorced	6	5.8
	Widowed	17	16.5
Education level	Primary	35	34.0
	Secondary	42	40.8
	Tertiary	16	15.5
	No response	10	9.7

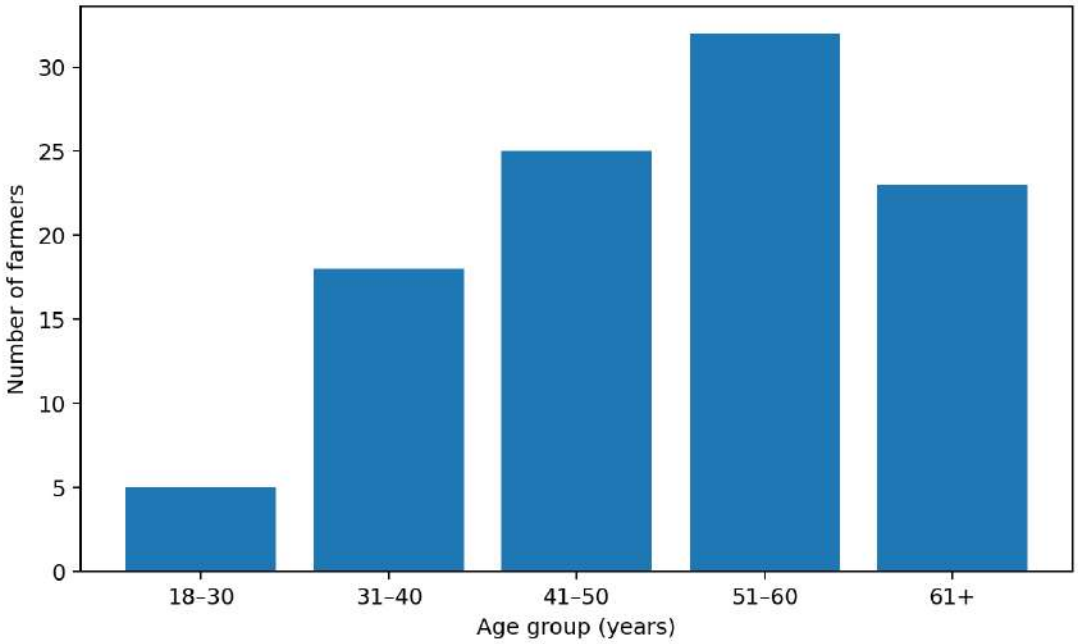


Figure 2: Age distribution of the Coffee farmers in Nakisuga sub-county, Mukono district.

4.2 COFFEE FARMING AND INSTITUTIONAL CHARACTERISTICS

Coffee production was largely undertaken for income generation. About 77.7% of respondents reported income as the main purpose of coffee production, while 20.4% indicated both income and household use. Arabica was reported by 40.8% of respondents, Robusta by 38.8%, and 20.4% grew both types. Family labour was the main source of labour for 45.6% of respondents, while 37.9% used both family and hired labour. Most respondents (85.4%) reported receiving extension services. Of those responses, farmer groups were the most frequently mentioned source (42.7%), followed by private buyers (35.0%). Membership in farmer groups/cooperatives was reported by 56.3% of respondents, while 45.6% had access to agricultural credit.

Table 2: Coffee farming and institutional characteristics of respondents

Parameter	Variable	Freq. (n=103)	Percent (%)
Main occupation	Business	55	53.4
	Crop farming	29	28.2
	Others	13	12.6
	Employment	6	5.8

Type of coffee	Arabica	42	40.8
	Robusta	40	38.8
	Both	21	20.4
Purpose of coffee	Income	80	77.7
	Both	21	20.4
	Home use	2	1.9
Source of labor for coffee farms	Family labor	47	45.6
	Both	39	37.9
	Hired	17	16.5
Access to extension services	Yes	88	85.4
	No	15	14.6
Extension source	Farmer group	44	42.7
	Private buyer	36	35.0
	Government	15	14.6
	NGO	8	7.8
Member of a farmer group?	Yes	58	56.3
	No	45	43.7
Access to Credit services?	Yes	47	45.6
	No	56	54.4

The mean age of the household heads was 52.3 years (SD=13.5), and respondents had an average of 15.7 years of coffee-farming experience. The average farm size was 2.48 acres, with a median of 2.0 acres. Land under coffee averaged 2.35 acres, with a median of 1.0 acres. The median reported coffee harvest was 600 kg per season, while the mean was 1695 kg, reflecting substantial variation between households. The nearest coffee market was a median of 5.0 km away.

Table 3: Selected continuous characteristics of respondents and coffee farms

Variable	**Mean**	**SD**	**Median**
Age of household head (years)	52.29	13.51	52.0
Household size	5.93	2.84	6.0

Coffee farming experience (years)	15.69	13.53	10.0
Farm size owned (acres)	2.48	2.26	2.0
Land under coffee (acres)	2.35	9.83	1.0
Quantity harvested per season (kg)	1695.04	3407.94	600.0
Distance to market (km)	6.98	4.38	5.0

4.3 POST-HARVEST HANDLING PRACTICES USED BY COFFEE FARMERS

4.3.1 Harvesting practices

Selective hand picking was the most common harvesting method, reported by 56.3% of the respondents, while 43.7% reported branch stripping. Despite this difference in harvesting method, almost all respondents (98.1%) indicated that they harvested only ripe cherries. Harvesting was mainly carried out weekly (48.5%) or after every 6 months (44.7%), with only a small proportion reporting monthly (4.9%) or daily (1.9%) harvesting.

Table 4: Harvesting practices used by coffee farmers

Parameter	**Variable**	**Freq. (n=103)**	**Percent (%)**
Harvesting method used	Selective hand picking	58	56.3
	Branch stripping	45	43.7
Harvest only ripe cherries	Yes	101	98.1
	No	2	1.9
Frequency of harvesting	Weekly	50	48.5
	After every 6 months	46	44.7
	Monthly	5	4.9
	Daily	2	1.9

4.3.2 Sorting and grading practices

Sorting was almost universal among the respondents, with 98.1% reporting that they sorted coffee after harvesting. Foreign materials were the most commonly removed item (38.8%), followed by damaged cherries (32.0%), unripe cherries (23.3%), and overripe cherries (5.8%). Buyers graded

coffee before purchase for 80.6% of the respondents, while 19.4% reported that buyers did not grade their coffee.

Table 5: Sorting and grading practices

Parameter	Variable	Freq. (n=103)	Percent (%)
Sort after harvesting	Yes	101	98.1
Sort after harvesting	No	2	1.9
Items removed	Foreign materials	40	38.8
Items removed	Damaged cherries	33	32.0
Items removed	Unripe cherries	24	23.3
Items removed	Overripe cherries	6	5.8
Buyer grades coffee	Yes	83	80.6
Buyer grades coffee	No	20	19.4

4.3.3 Drying practices

Drying practices varied considerably across respondents. Drying on bare ground was the most common method (53.4%), followed by drying on concrete floors (21.4%) and tarpaulins (21.4%). Only 3.9% used raised drying racks. Almost all farmers (97.1%) reported protecting coffee from rain during drying. The predominance of bare-ground drying indicates that improved drying technology was not yet widespread among the surveyed farmers.

Table 6: Coffee drying practices used by respondents

Drying practice	Freq. (n=103)	Percent (%)
Bare ground	55	53.4
Concrete floor	22	21.4
Tarpaulin	22	21.4
Raised racks	4	3.9
Protect from rain: Yes	100	97.1
Protect from rain: No	3	2.9

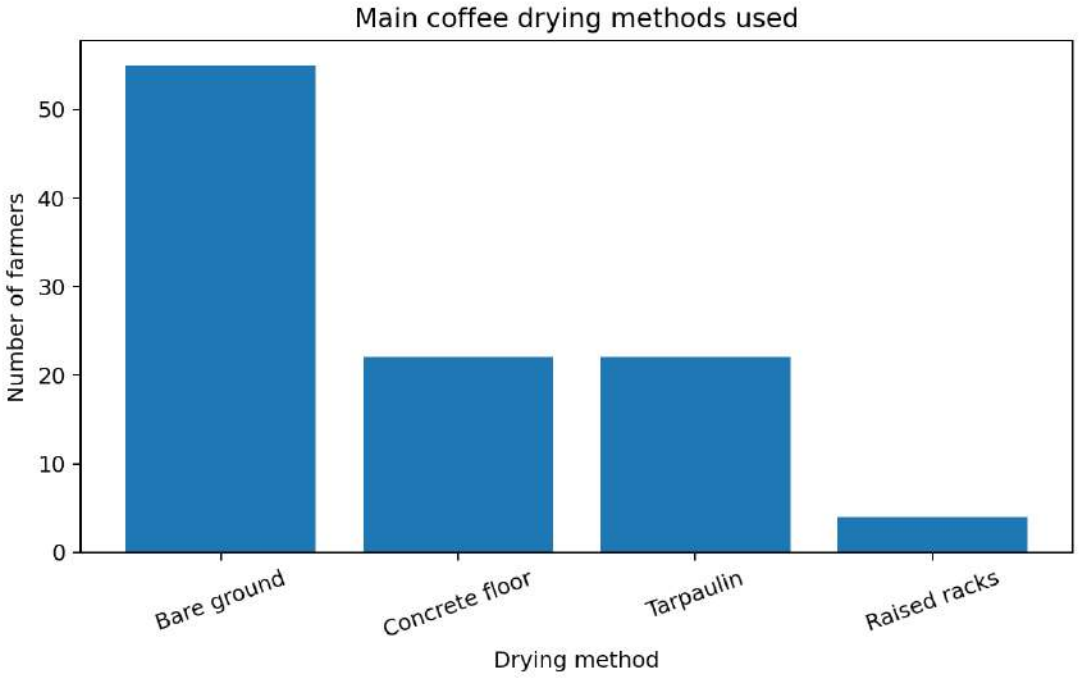


Figure 2: Main coffee drying methods used by respondents

4.3.4 Storage and packaging practices

Most respondents stored dried coffee in a store house (66.0%), while 27.2% kept it in the living house. Temporary shelters accounted for 5.8%, and only 1.0% used a warehouse. Polypropylene bags were the most commonly used packaging material (50.5%), followed by jute bags (36.9%) and plastic containers (12.6%). In addition, 98.1% reported protecting stored coffee against pests and moisture.

Table 7: Storage and packaging practices

Parameter	Variable	Freq. (n=103)	Percent (%)
Storage facility	Store house	68	66.0
	Living house	28	27.2
	Temporary shelter	6	5.8
	Warehouse	1	1.0
Packaging	Polypropylene bags	52	50.5
	Jute bags	38	36.9
	Plastic containers	13	12.6

Protect against pests/moisture?	Yes	101	98.1
	No	2	1.9

4.3.5 Transportation, marketing and price-related outcomes

Motorcycles were the main means of transporting coffee to market (49.5%), followed by vehicles (20.4%) and bicycles (15.5%). Middlemen were the largest buyer category (41.7%), followed by local traders and cooperatives, each accounting for 25.2%. Only 7.8% sold to processors or exporters. A large majority of respondents (85.4%) reported having received lower prices because of poor coffee quality. The median reported selling price was UGX 8,000 per kilogram; reported values varied substantially across respondents.

Table 8: Transportation, coffee buyers and price-related experiences

Parameter	Variable	Freq. (n=103)	Percent (%)
Transport	Motorcycle	51	49.5
	Vehicle	21	20.4
	Bicycle	16	15.5
	Tricycle (Tuku tuku)	9	8.7
	On foot	6	5.8
Buyer	Middlemen	43	41.7
	Local trader	26	25.2
	Cooperative	26	25.2
	Processor/exporter	8	7.8
Lower price due to poor quality	Yes	88	85.4
Lower price due to poor quality	No	15	14.6

4.4 ADOPTION PATTERN OF POST-HARVEST HANDLING PRACTICES

The five practice indicators in the questionnaire were combined to describe the overall pattern of adoption. Selective harvesting, sorting/grading, improved drying, proper storage and recommended packaging were coded as binary adoption indicators. The results show that no

respondent fell into the zero-, one- or two-practice categories. Ten respondents (9.7%) adopted three practices, 38 (36.9%) adopted four practices, while 55 (53.4%) reported all five practices.

Table 9: Adoption of selected post-harvest handling practices

Practice	Yes (Freq.)	Yes (%)	No (Freq.)	No (%)
Selective harvesting	102	99.0	1	1.0
Sorting/grading	94	91.3	9	8.7
Drying on tarpaulin/raised racks	68	66.0	35	34.0
Proper storage	95	92.2	8	7.8
Recommended packaging	98	95.1	5	4.9

Table 10: Typology of coffee farmers based on number of post-harvest practices adopted

Farmer typology	Frequency (n=103)	Percent (%)
Selective adopters (3 practices)	10	9.7
Broad adopters (4 practices)	38	36.9
Comprehensive adopters (5 practices)	55	53.4

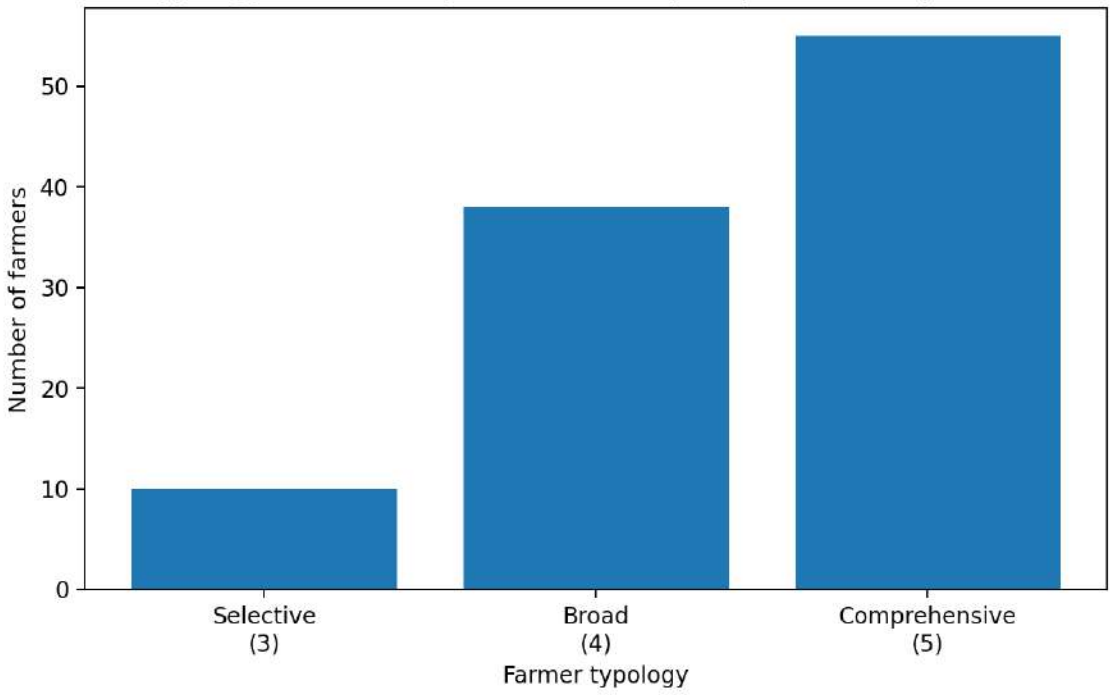


Figure 3: Typology of farmers based on number of post-harvest handling practices adopted

Table 11: Cross-tabulation of farmer typologies and individual post-harvest practices

Typology	n	Selective harvesting (%)	Sorting/ Grading (%)	Improved drying (%)	Proper storage (%)	Recommended packaging (%)
Selective adopters (3)	10	100.0	50.0	10.0	60.0	80.0
Broad adopters (4)	38	97.4	89.5	31.6	89.5	92.1
Comprehensive adopters (5)	55	100.0	100.0	100.0	100.0	100.0

The cross-tabulation shows that the clearest practice separating the typologies was drying. Only 10.0% of selective adopters used tarpaulins or raised racks, compared with 31.6% of broad adopters and 100.0% of comprehensive adopters. Sorting and proper storage also increased progressively across the typologies. This pattern suggests that farmers could be distinguished primarily by the extent to which they combine improved handling practices rather than by adoption of a single practice.

4.5 FACTORS INFLUENCING CHOICE OF POST-HARVEST HANDLING PRACTICES

Respondents were asked to rate factors that may influence their post-harvest handling decisions using a five-point scale. Weather conditions received the highest mean score (4.67), indicating that respondents strongly associated drying decisions with weather. Education had a mean score of 4.46, while coffee prices scored 4.40. Perceived effects of limited storage facilities, access to credit, farmer-group membership and extension services also received relatively high scores. Distance to market had the lowest mean score (3.63), although it still indicated a generally positive perception that market distance affects handling decisions.

Table 12: Respondents' perceptions of factors influencing post-harvest handling choices

Statement	Mean score
Education influences handling practices	4.46
Extension services improve handling decisions	4.27
Access to credit enables improved practices	4.3
Farmer-group membership improves knowledge	4.3
Distance to market affects handling	3.63
Coffee prices influence adoption	4.4
Lack of storage limits proper handling	4.32
Weather affects drying practices	4.67

4.8 MULTIVARIATE PROBIT ANALYSIS OF DRIVERS OF POST-HARVEST HANDLING CHOICE

The multinomial logit model was used to examine factors influencing farmers' choice of coffee post-harvest handling practices. The dependent variable consisted of three mutually exclusive categories: improved drying only, proper storage only, and both improved drying and proper storage. Farmers who used neither practice were excluded from the model, resulting in 100 observations. The category of farmers using both improved drying and proper storage was used as the reference outcome.

The model was statistically significant overall (LR $\chi^2 = 66.10$, $p < 0.001$), with a pseudo R^2 of 0.410, indicating that the explanatory variables jointly contributed to explaining farmers' choice of post-harvest handling practices. Gender and coffee farming experience significantly influenced the choice of proper storage only relative to both practices, while quantity harvested was also significant in this category. Most of the other explanatory variables were not statistically significant at the 5% level.

Explanatory variable	Improved drying only Coef.	p-value	Proper storage only Coef.	p-value
Age of household head	-2.107	0.105	-0.021	0.972
Gender of household head	-0.332	0.802	1.785	0.033

Education level	0.442	0.584	-0.253	0.523
Household size	0.672	0.237	-0.422	0.316
Coffee farming experience	2.759	0.057	-3.640	0.012
Farm size owned	0.868	0.690	0.233	0.848
Land under coffee	-0.918	0.658	-1.905	0.149
Quantity harvested (log)	-1.218	0.295	1.816	0.009
Farmer-group membership	-0.631	0.711	-1.944	0.091
Access to agricultural credit	-0.023	0.990	1.110	0.241
Distance to nearest coffee market	0.050	0.966	0.119	0.793
Constant	-3.845	0.015	-2.186	0.006

Model statistics: N = 100; Log likelihood = −47.501; LR χ^2 = 66.10; Prob > χ^2 < 0.001; Pseudo R^2 = 0.410.
Reference category: Both improved drying and proper storage.

4.6 CHALLENGES FACED IN POST-HARVEST HANDLING

Low coffee prices and unpredictable weather were the most frequently reported challenges, each mentioned by 96.1% of respondents. Limited extension support was reported by 93.2%, while poor market access was mentioned by 88.3%. Inadequate drying facilities affected 86.4% of respondents, and high transportation costs affected 82.5%. Lack of storage facilities was reported by 58.3%.

Table 13: Challenges faced by coffee farmers in post-harvest handling

Challenge	Yes (Freq.)	Percent (%)
Low coffee prices	99	96.1
Unpredictable weather	99	96.1
Limited extension support	96	93.2
Poor market access	91	88.3
Inadequate drying facilities	89	86.4
High transportation costs	85	82.5
Lack of storage facilities	60	58.3

4.7 FARMERS' SUGGESTIONS FOR IMPROVING POST-HARVEST HANDLING

The most recurrent suggestions concerned increased extension and farmer education, followed by better storage and quality management, improved market access and prices, access to equipment and handling materials, and stronger farmer groups.

Table 14: Main themes from farmers' suggestions for improving post-harvest handling

Coded suggestion theme	Freq. (n=103)	Percent (%)
More extension/ farmer education	28	27.2
Improved market access/prices	21	20.4
Improved equipment/handling materials	14	13.6
Better storage/ quality standards	6	5.8
Farmer groups/cooperatives	2	1.9

CHAPTER FIVE

DISCUSSION OF RESULTS

The study analysed the adoption of improved coffee post-harvest handling practices among coffee farmers in Nakisunga Sub-County, Mukono District. The five practices considered were selective harvesting, sorting/grading, improved drying, proper storage and recommended packaging. These practices were selected because they represent important stages through which farmers can preserve coffee quality after harvesting. UCDA identifies careful harvesting, drying on appropriate surfaces, sorting and proper storage as important components of coffee quality management, while the Uganda Coffee Sub-Sector Strategy identifies limited access to and use of modern post-harvest technologies as an important constraint to coffee quality and prices (UCDA, 2020).

Regarding the first objective, the findings showed that adoption was generally high across the five practices, although important differences existed between individual practices. Selective harvesting had the highest level of adoption, with 102 out of 103 farmers reporting that they selectively harvested coffee. Similarly, 101 farmers reported sorting or grading coffee after harvesting, 98 used recommended packaging materials, and 95 reported proper storage practices. Improved drying had the lowest adoption, with 68 farmers reporting that they dried coffee on tarpaulins or raised racks. The results therefore indicate that adoption in Nakisunga is strongest for harvesting, sorting/grading, packaging and storage, while improved drying remains the main adoption gap.

The almost universal adoption of selective harvesting is encouraging because harvesting is the first major point at which coffee quality can be protected or compromised. UCDA recommends selective picking of ripe cherries while leaving immature cherries on the plant, since the harvesting of immature cherries contributes to poor quality (UCDA, 2020). The high adoption found in Nakisunga is therefore consistent with national recommendations and suggests that farmers have considerable awareness of the importance of harvesting mature cherries. It also compares favourably with the concern raised in the national coffee strategy that some farmers continue to harvest immature cherries because of inadequate knowledge or fear of theft before cherries reach maturity (UCDA, 2020). The difference may partly reflect increasing sensitisation of coffee farmers and the presence of coffee quality messages within extension and farmer networks.

The high adoption of sorting and grading is also important because sorting allows farmers to remove immature, damaged and foreign materials that can negatively affect the quality of coffee. UCDA guidance requires careful separation of undesirable materials before processing and further sorting after processing (UCDA, 2024). The finding is supported by a recent Makerere University study in Nebbi District, which reported widespread engagement in sorting among smallholder coffee farmers and recommended greater emphasis on sorting and grading because of their relationship with coffee quality and revenue (Angeorwoth, 2025). Thus, the high level of sorting/grading adoption in Nakisunga is consistent with evidence from another Ugandan coffee-growing area and suggests that farmers may find sorting relatively practical compared with technologies requiring substantial physical investment.

Recommended packaging was also highly adopted, with 98 farmers reporting its use. Proper packaging is important because coffee can absorb moisture, odours and contaminants during handling and transportation. The high adoption may indicate that packaging is a relatively accessible practice for farmers compared with improved drying infrastructure. However, adoption of packaging should not be considered in isolation from storage and drying. Coffee that is poorly dried or stored can deteriorate even when appropriate packaging is used. This supports the broader position of UCDA that quality is determined by a sequence of interconnected post-harvest operations rather than by one practice alone (UCDA, 2020).

Proper storage was adopted by 95 farmers, making it one of the most widely adopted practices. This finding is important because maintaining coffee quality after drying requires appropriate storage conditions. UCDA identifies storage as part of the post-harvest handling system that requires modernization, particularly where farmers lack appropriate facilities (UCDA, 2020). The relatively high adoption in Nakisunga may indicate that farmers have developed practical methods of protecting coffee after drying. However, the finding does not necessarily mean that farmers have access to modern storage facilities. Adoption may instead involve relatively simple measures such as keeping coffee in suitable bags and protecting it from moisture and contamination.

Improved drying was the least adopted of the five practices, despite being central to coffee quality. UCDA recommends that drying should begin immediately after harvesting, using suitable surfaces such as raised trays or tarpaulins, and that coffee should be protected from rewetting until the appropriate moisture level is achieved (UCDA, 2024). The lower adoption observed in Nakisunga

therefore represents a significant weakness in the post-harvest chain. This finding agrees with UCDA's observation that access to and use of modern post-harvest technologies remain limited among coffee farmers (UCDA, 2020). It is also consistent with UCDA's promotion of solar dryers and tarpaulins, which were introduced partly to reduce contamination and shorten drying periods (UCDA, 2022). More recent research in Uganda further demonstrates the importance of improved drying, with Zziwa et al. (2025) reporting that a hybrid solar-biomass dryer substantially reduced drying time while maintaining acceptable coffee quality. The lower adoption of improved drying in Nakisunga may therefore reflect the greater financial and infrastructural requirements associated with the practice rather than simply a lack of awareness.

The results for the first objective consequently suggest that adoption of improved post-harvest handling is not uniform across practices. Farmers have largely adopted practices such as selective harvesting, sorting/grading, packaging and storage, but improved drying remains comparatively less adopted. This pattern supports the argument that adoption is multidimensional. Recent work on coffee farmers in Uganda similarly argues for measuring adoption intensity rather than treating adoption as a simple yes-or-no decision (2025). The present study contributes to this understanding by examining the combination of five specific post-harvest practices rather than treating adoption as a single practice.

For the second objective, farmers were classified according to the number of the five improved practices they adopted. Ten farmers adopted three practices, 38 adopted four practices, while 55 farmers adopted all five practices. Therefore, the largest group comprised farmers with comprehensive adoption, followed by farmers adopting four practices, while only a small proportion adopted three practices. This indicates that most farmers had moved beyond adoption of isolated practices and were combining several recommended post-harvest practices. However, the existence of farmers who had not adopted all five practices demonstrates that there remains room for improving the completeness of adoption.

The typology is particularly useful because the five practices are complementary. Selective harvesting provides better-quality cherries for subsequent handling; sorting removes undesirable material; improved drying reduces deterioration; proper storage preserves quality after drying; and recommended packaging protects the product during storage and movement. Consequently, failure to adopt one practice can reduce the benefits obtained from the others. A farmer who selectively

harvests and sorts coffee but dries it on unsuitable surfaces may still experience quality deterioration. Similarly, good drying may have limited benefits if coffee is subsequently stored under poor conditions. This interconnectedness supports the national coffee strategy's treatment of post-harvest handling as a chain of operations rather than independent activities (UCDA, 2020).

The predominance of comprehensive adopters may partly reflect increased access to information and farmer sensitisation. A recent Ugandan study among coffee farmers in Bulambuli found that access to post-harvest management information, age, gender and farmer-group membership influenced adoption of improved post-harvest management practices (Wasike, 2025). This supports the present finding that adoption should be understood within the wider information and institutional environment surrounding farmers. However, the lower number of farmers adopting all five practices also suggests that knowledge alone may not be sufficient. Kigozi and Mibulo (2023) identified access to equipment and the cost of post-harvest technologies as persistent constraints to utilisation of post-harvest technologies in Uganda. This is particularly relevant to improved drying, which requires facilities that may not be readily available to individual smallholder farmers.

For the third objective, a multinomial logit model was used to examine factors influencing farmers' choice among three post-harvest handling combinations: improved drying only, proper storage only, and both improved drying and proper storage. Farmers who adopted neither practice were excluded because the analysis focused on these three observed combinations. The category of farmers adopting both improved drying and proper storage was used as the reference category. The model was statistically significant overall (LR $\chi^2 = 66.10$, $p < 0.001$) and had a pseudo R^2 of 0.410, indicating that the explanatory variables jointly provided substantial information for distinguishing farmers' post-harvest handling choices.

The model showed that gender significantly influenced the choice of proper storage only relative to adopting both improved drying and proper storage. This suggests that gender-related differences exist in the combination of post-harvest practices adopted by farmers. The finding is consistent with Wasike (2025), who identified gender as one of the factors influencing adoption of improved coffee post-harvest management practices in Bulambuli. However, the present study extends this evidence by showing that gender was significant for a particular combination of practices rather

than simply for overall adoption. This distinction is important because farmers may differ not only in whether they adopt an improved practice but also in which combination of practices they adopt.

Coffee farming experience was also significant in the storage-only equation and was marginally significant in the improved-drying-only equation. The negative coefficient for experience in the storage-only category indicates that more experienced farmers were less likely to belong to the storage-only group relative to farmers who adopted both drying and storage. One possible interpretation is that experienced farmers may have accumulated practical knowledge of the consequences of incomplete post-harvest handling and therefore be more inclined to combine practices. This interpretation is supported by research on experiential learning among Ugandan coffee farmers, which shows that farmers acquire knowledge through repeated production experiences, interaction with other farmers and engagement with innovation platforms. Nevertheless, because the study is cross-sectional, the result should be interpreted as an association rather than evidence that experience directly causes adoption.

Quantity harvested also significantly influenced the storage-only choice. Farmers with larger harvested quantities were more likely to be in the storage-only category relative to the combined drying-and-storage category. This may be because farmers handling larger quantities have greater quantities of coffee requiring protection after harvest and therefore place greater emphasis on storage. However, the lack of significance for the improved-drying-only category suggests that production volume does not automatically translate into adoption of all improved post-harvest practices.

Other variables, including age, education, household size, farm size, land under coffee, farmer-group membership, access to agricultural credit and distance to the nearest coffee market, were not statistically significant in the multinomial model. This contrasts with studies such as Nabaasa et al. (2022), which found institutional and market-related factors to be important in technology adoption among smallholder coffee farmers in Kanungu. Similarly, studies in Uganda have highlighted the role of extension and information access in agricultural technology adoption (Karatunga, 2022; Wasike, 2025). The difference may be explained by the fact that the present model examines the choice between specific combinations of post-harvest practices rather than adoption of agricultural technologies generally. It may also reflect differences in location,

technology characteristics and the relatively small number of farmers in the improved-drying-only category.

The model therefore provides an important addition to the descriptive findings. While the first objective showed that individual adoption rates were generally high, and the second demonstrated that most farmers adopted several practices simultaneously, the multinomial analysis shows that farmers do not arrive at these combinations for exactly the same reasons. Gender, experience and quantity harvested were particularly relevant in distinguishing storage-only farmers from those adopting both drying and storage. The findings consequently support the need for interventions that promote adoption of the complete five-practice package rather than focusing on individual practices in isolation.

Overall, the study demonstrates that adoption of improved coffee post-harvest handling practices in Nakisunga Sub-County is relatively high but incomplete. Selective harvesting, sorting/grading, recommended packaging and proper storage were widely adopted, whereas improved drying remained the weakest of the five practices. The typology further showed that more than half of the farmers had adopted all five practices, while others remained partial adopters. The multinomial logit model demonstrated that gender, farming experience and quantity harvested were important in distinguishing particular adoption choices, although most explanatory variables were not statistically significant. These findings reinforce the importance of strengthening farmer knowledge while simultaneously improving access to appropriate drying and storage infrastructure, since the evidence suggests that the main challenge is not simply whether farmers know about improved practices, but whether they can adopt and combine them effectively.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study concludes that coffee farmers in Nakisunga Sub-County practise a range of post-harvest handling activities, including harvesting, sorting, drying, storage and packaging. While the adoption of several basic practices was high, important gaps remained, particularly in drying, where many farmers continued to use bare-ground drying. The study further established three farmer typologies—selective adopters, broad adopters and comprehensive adopters—with improved drying being one of the main practices distinguishing the groups.

The study also concludes that farmers' post-harvest handling choices are influenced by economic, institutional and physical factors, including coffee prices, weather conditions, market access, extension and farmer characteristics. The findings therefore demonstrate that improving coffee post-harvest handling in Nakisunga requires more than farmer awareness; it requires practical access to improved drying and storage facilities, effective extension services and markets that provide clear incentives for better-quality coffee.

6.2 Recommendations

Farmers should be encouraged to reduce the use of bare-ground drying and adopt improved drying methods. Since drying was the major area of difference among farmers, greater emphasis should be placed on the use of tarpaulins, raised drying racks and other appropriate drying facilities. Farmer groups can collectively acquire and manage drying facilities where individual farmers cannot afford them.

The District Production and Extension Services should strengthen practical training on post-harvest handling. Extension workers should place greater emphasis on practical demonstrations covering selective harvesting, sorting, appropriate drying, moisture management, storage and packaging. Training should particularly target farmers in the selective-adopter category so that they can progressively adopt a wider range of recommended practices.

Coffee farmer groups and cooperatives should be strengthened to facilitate collective access to post-harvest facilities. Collective ownership of tarpaulins, raised drying racks, moisture meters

and appropriate storage facilities could reduce the financial burden on individual farmers. Farmer organisations can also improve access to technical information and facilitate collective marketing.

Coffee buyers and farmer organisations should strengthen quality-based marketing arrangements. Since most respondents reported receiving lower prices because of poor coffee quality, farmers should be provided with clear information on how coffee quality is assessed and how quality differences translate into prices. Transparent grading and pricing would provide stronger incentives for farmers to invest in improved post-harvest handling.

Access to extension and market information should be improved for farmers located farther from markets. The negative association between market distance and improved drying suggests that farmers who are geographically distant from markets may have weaker access to quality information and market incentives. Extension services should therefore deliberately reach farmers in more remote areas rather than concentrating services around easily accessible trading centres.

The District Local Government and development partners should support investment in community-level post-harvest infrastructure. Programmes supporting coffee farmers should consider providing or subsidising appropriate drying and storage facilities, particularly where farmers lack the resources to acquire them individually. Such support should be accompanied by training to ensure that facilities are properly used and maintained.

Farmers should be encouraged to integrate post-harvest practices rather than focusing on individual activities. Good harvesting and sorting can be undermined by poor drying, while properly dried coffee can subsequently lose quality through inappropriate storage or transportation. Extension programmes should therefore promote post-harvest handling as a complete chain from harvesting through marketing.

Further research should examine the economic returns associated with different post-harvest handling typologies. Future studies could quantify the costs, selling prices, gross margins and net returns associated with selective, broad and comprehensive handling practices. Such research would provide stronger evidence on whether additional investment in improved post-harvest handling translates into higher financial returns for smallholder coffee farmers in Mukono District.

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APPENDICES

APPENDIX I; QUESTIONNAIRE OF THE STUDY

QUESTIONNAIRE

Title: Adoption of Improved Coffee Post Handling Practices in Nakisunga Sub-County, Mukono District.

Introduction

My name is **Byamukama Luke,** a student from the Department of Department of Agriculture and Natural resources economics, at Makerere University, currently pursuing a Bachelor's degree in in Agribusiness management. This questionnaire is designed to collect information on coffee post-harvest handling practices among farmers in Mukono District. The study aims to understand the different practices used, the factors influencing these practices, and their implications on coffee quality and income. The information you provide will be used strictly for academic purposes and will be treated with confidentiality. Your participation is voluntary and highly appreciated.

Please tick (✓) or fill in the appropriate response where necessary

IDENTIFICATION INFORMATION

1. Questionnaire Number: _____
2. Date of Interview: _____
3. District: _____
4. Sub-county: _____
5. Parish: _____
6. Village: _____
7. GPS Coordinates
   Latitude: _____
   Longitude: _____

SECTION A: HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

Variable	Response
A1. Gender of household head	1=Male, 2=Female
A2. Age of household head (years)	_____
A3. Marital status	1=Single, 2=Married, 3=Divorced, 4=Widowed
A4. Highest education attained	0=None, 1=Primary, 2=Secondary, 3=Tertiary
A5. Household size	_____
A6. Main occupation	1=Crop farming, 2=Business, 3=Employment, 4=Others
A7. Years of experience in coffee farming	_____
A8. Farm size owned (acres)	_____
A9. Land under coffee production (acres)	_____

SECTION B: COFFEE FARMING CHARACTERISTICS

Variable	Response
B1. Type of coffee grown	1=Robusta, 2=Arabica, 3=Both
B2. Average quantity harvested per season (kg)	_____
B3. Main purpose of coffee production	1=Income, 2=Home use, 3=Both
B4. Source of labor	1=Family, 2=Hired, 3=Both
B5. Do you receive extension services?	1=Yes, 0=No
B6. Source of extension services	1=Government, 2=NGO, 3=Farmer group, 4=Private buyer
B7. Membership in farmer group/cooperative	1=Yes, 0=No
B8. Access to agricultural credit	1=Yes, 0=No
B9. Distance to nearest coffee market (km)	_____

SECTION C: POST-HARVEST HANDLING PRACTICES

C1: Harvesting Practices

Variable	Response
C1.1 Method used during harvesting	1=Selective picking, 2=Strip picking
C1.2 Do you harvest only ripe cherries?	1=Yes, 0=No
C1.3 Frequency of harvesting	1=Daily, 2=Weekly, 3=Seasonally

C2: Sorting and Grading

Variable	Response
C2.1 Do you sort coffee after harvesting?	1=Yes, 0=No
C2.2 What do you remove during sorting?	1=Unripe cherries, 2=Overripe cherries, 3=Damaged cherries, 4=Foreign materials
C2.3 Do buyers grade your coffee before purchase?	1=Yes, 0=No

C3: Drying Practices

Variable	Response
C3.1 Main drying method used	1=Bare ground, 2=Tarpaulin, 3=Raised racks, 4=Concrete floor
C3.2 Average drying period (days)	_____
C3.3 Do you protect coffee from rain during drying?	1=Yes, 0=No
C3.4 Who decides the drying method used?	1=Household head, 2=Spouse, 3=Joint decision

C4: Storage Practices

Variable	Response
C4.1 Storage facility used	1=Store house, 2=Living house, 3=Warehouse, 4=Temporary shelter
C4.2 Packaging material used	1=Jute bags, 2=Polypropylene bags, 3=Plastic containers
C4.3 Do you protect coffee against pests and moisture?	1=Yes, 0=No
C4.4 Average storage duration before sale	_____

C5: Transportation and Marketing

Variable	Response
C5.1 Main means of transport	1=Bicycle, 2=Motorcycle, 3=Vehicle, 4=On foot
C5.2 Main buyer of coffee	1=Middlemen, 2=Cooperative, 3=Processor/exporter, 4=Local trader
C5.3 Average selling price per kg (UGX)	_____
C5.4 Have you ever received lower prices due to poor quality?	1=Yes, 0=No

SECTION D: ADOPTION OF POST-HARVEST HANDLING PRACTICES (MVP model)

Please indicate whether you practice the following:

Practice	Yes	No
D1. Selective harvesting	1	0
D2. Sorting/grading after harvesting	1	0
D3. Drying on tarpaulins/raised racks	1	0
D4. Proper storage practices	1	0
D5. Use of recommended packaging materials	1	0

SECTION E: FACTORS INFLUENCING CHOICE OF POST-HARVEST PRACTICES

Using the scale below:

1 = Strongly Disagree **2** = Disagree **3** = Neutral **4** = Agree **5** = Strongly Agree

Statement	1	2	3	4	5
E1. Education influences my handling practices	☐	☐	☐	☐	☐
E2. Extension services improve my post-harvest handling decisions	☐	☐	☐	☐	☐
E3. Access to credit enables adoption of improved practices	☐	☐	☐	☐	☐
E4. Membership in farmer groups improves my knowledge	☐	☐	☐	☐	☐
E5. Distance to market affects handling practices	☐	☐	☐	☐	☐
E6. Coffee prices influence adoption of improved practices	☐	☐	☐	☐	☐
E7. Lack of storage facilities limits proper handling	☐	☐	☐	☐	☐
E8. Weather conditions affect drying practices	☐	☐	☐	☐	☐

SECTION F: CHALLENGES FACED IN POST-HARVEST HANDLING

Challenge	Yes	No
F1. Inadequate drying facilities	1	0
F2. Lack of storage facilities	1	0
F3. Limited extension support	1	0
F4. Poor market access	1	0
F5. Low coffee prices	1	0
F6. High transportation costs	1	0
F7. Unpredictable weather	1	0

SECTION G: FARMER SUGGESTIONS

G1. In your opinion, what should be done to improve coffee post-harvest handling practices in your area?

……
……
……
……
……
……..

ENUMERATOR'S OBSERVATION CHECKLIST

Observation	Yes	No
Coffee dried on bare ground	☐	☐
Use of tarpaulin during drying	☐	☐
Presence of proper storage facility	☐	☐
Presence of moisture contamination	☐	☐
Use of improved packaging materials	☐	☐

APPENDIX II; PICTORIALS OF THE STUDY














SAN ANTONIO

