
**Determinants and Welfare Impact of Market
Participation and Marketing Channel Choice among
Smallholder Rice Farmers in Oyo State, Nigeria.**

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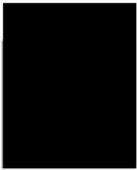
DEDICATION

This dissertation is dedicated with love to the Almighty God. Also, to my parents, Evangelist Joshua Abidoeye Adeoye and Mrs Abigail Foluke Adeoye.

DECLARATION

I, Ajibade Olumuyiwa Adeoye, declare that:

- (i) The research reported in this thesis is my original research work.
- (ii) This thesis has never been submitted for any degree or examination at any other university or institution of higher learning.
- (iii) This thesis does not contain other authors' data, pictures, tables, graphs, or other information unless specifically acknowledged as being sourced from those authors. Where other written sources were quoted:
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Signed: 

Date: 06 – JUNE– 2025

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As the candidate's main supervisor, I, Professor Lloyd Baiyegunhi, agree to the submission of this thesis.

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Date: 06 June 2025

Professor Lloyd J.S. Baiyegunhi

(Supervisor)

ABSTRACT

This study investigates the determinants of market participation, marketing channel choice, and their implications for the welfare of smallholder rice farmers in Oyo State, Nigeria. Drawing on primary data from 200 rice-producing households, the analysis employs a Double Hurdle model to assess participation and intensity of commercialization, a Multinomial Logit (MNL) model to evaluate marketing channel selection, and a Multinomial Endogenous Switching Regression (MESR) model to estimate the welfare effects of different marketing channels.

Results reveal that 83% of respondents participated in rice markets, with millers being the dominant channel (64%), followed by wholesalers (26%) and brokers (10%). Market participation was significantly influenced by demographic factors and institutional and transaction cost variables, including age, gender, education, household size, access to credit, ownership of storage facilities, and satisfaction with market prices. The intensity of commercialization was further shaped by farm size, farming experience, access to extension, non-farm income, and transaction cost-related factors such as market distance and transport.

Marketing channel choice was determined by a combination of household demographics, farm characteristics, institutional access, and transaction costs. Notably, male farmers and those with larger farms were more likely to sell to wholesalers, while farmers with higher education levels were more inclined to engage brokers. The MESR model confirmed that market participation significantly improved net farm income and food security, with the greatest benefits accruing to farmers who sold directly to millers.

These findings underscore the critical role of structured marketing channels and institutional support in enhancing smallholder welfare. The study recommends targeted policy interventions to strengthen market linkages, reduce transaction costs, expand rural infrastructure, and improve farmer access to extension services and marketing literacy. Gender-sensitive approaches and the adoption of digital marketing tools are also highlighted as key strategies to promote equitable and efficient market participation.

LISTS OF ACRONYMS

AHM:	Agricultural Household Model
ARC:	Agricultural Research Council
ATT:	Average Treatment Effect on the Treated
CBN:	Central Bank of Nigeria
DH:	Double Hurdle
ESR:	Multinomial Endogenous Switching Regression
FAO:	Food and Agriculture Organization
GDP:	Gross Domestic Product
HFIAS:	Household Food Insecurity Access Scale
IITA:	International Institute of Tropical Agriculture
IMR:	Inverse Mills Ratio
IRRI:	International Rice Research Institute
MESR:	Multinomial Endogenous Switching Regression
MNL:	Multinomial Logit
NBS:	National Bureau of Statistics
NCRI:	National Crop Research Institute
NFI:	Net Farm Income
NIE:	New Institutional Economics
OECD:	Organization for Economic Co-operation and Development
OLS:	Ordinary Least Squares
RUM:	Random Utility Model
SDGs:	Sustainable Development Goals
SPSS:	Statistical Package for the Social Sciences
STATA:	Data analysis and statistical software
USAID:	United States Agency for International Development
TCE:	Transaction Cost Economics

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CHAPTER 1: INTRODUCTION

Introduction

Chapter One introduces the study on the welfare impact of marketing channels among smallholder rice farmers in Oyo State, western Nigeria. It begins with an overview of the research background, followed by a statement of the problem that identifies key gaps in existing knowledge. The chapter also outlines the research questions and objectives that shape the study's direction. It concludes with a justification of the research, emphasizing its significance for both academic inquiry and practical policy development.

1.1 Background of the Study

Agriculture continues to serve as a critical driver of economic growth in many nations, particularly within developing economies, where it underpins livelihoods, ensures food security, and contributes substantially to GDP. For instance, in Sub-Saharan Africa, agriculture accounts for approximately 23% of GDP and employs over 60% of the workforce (World Bank, 2021; FAO, 2017), highlighting its centrality to economic and social stability. As of Q4 2024, agriculture accounted for approximately 25.6% of GDP, and contributed 23.3% in Q1 2025, a significant share by any measure, especially given that over 30% of the workforce is employed in the sector and crop production remains the dominant sub-segment (National Bureau of Statistics [NBS], 2025; AgroCentric, 2025; Premium Times, 2025).

Rice is both a staple food and a significant source of income for Nigerian households. It is widely consumed across all regions, irrespective of cultural or socioeconomic differences. Per capita rice consumption is estimated at 29 kg annually, and it continues to grow at an annual rate of 11%, largely driven by rapid population growth, urbanization, and rising household incomes (United States Agency for International Development [USAID], 2022). Despite its importance, domestic production has consistently lagged behind national demand. In 2020, Nigeria's rice demand reached approximately 6.3 million metric tonnes, while local production accounted for only 2.3 million metric tonnes (NBS, 2021b). This supply gap has necessitated continued reliance on rice imports, resulting in foreign exchange losses and undermining efforts to achieve national food self-sufficiency. Despite national leadership in rice production, a persistent supply gap exists, driven

by production constraints and market inefficiencies—that underpin the urgency of improving access and channel productivity in the rice value chain.

Nigeria is the leading producer of rice in West Africa, with an average annual output of 3.2 million metric tonnes of paddy (International Rice Research Institute [IRRI], 2020). However, over 90% of this production is carried out by smallholder farmers, most of whom cultivate less than two hectares. These smallholders are often constrained by low productivity, limited access to improved seeds and inputs, inadequate extension services, and poor access to mechanization and irrigation facilities (Amankwah, 2023; Begho & Begho, 2023). These production challenges are compounded by inefficiencies in post-harvest handling, storage, processing, and, critically, in marketing systems.

The marketing of agricultural produce—especially staple crops like rice—plays a vital role in determining the incomes, investment decisions, and overall welfare of smallholder farmers. In the context of Nigeria and other sub-Saharan African countries, markets serve not only as outlets for surplus produce but also as platforms for acquiring inputs, accessing information, and connecting with broader value chains (Addison et al., 2020; Abdul-Rahaman et al., 2020). Effective market participation has been shown to improve food security, reduce poverty, and enhance the economic resilience of farming households (Barrett, 2008; Haile et al., 2022).

However, Nigerian smallholders often operate within fragmented and underdeveloped marketing systems. In many cases, they lack access to timely market information, affordable transport, or reliable storage infrastructure. These limitations increase transaction costs, reduce bargaining power, and force farmers to sell produce at low prices immediately after harvest, when supply is high and prices are lowest, only to repurchase at higher prices during the lean season (Adeshina et al., 2020; Kotler & Armstrong, 2012). These dynamics limit farmers' ability to accumulate capital, invest in productivity-enhancing inputs, or improve their standard of living.

A critical but often under-examined aspect of market participation is the choice of marketing channel. Marketing channels refer to the various pathways through which products move from producers to final consumers. These can include direct-to-consumer sales, cooperatives, middlemen, wholesalers, processors, or formal retail outlets. Each channel has distinct implications for price realization, risk exposure, and service access (Fischer & Qaim, 2012;

Mmbando et al., 2017). Selecting an appropriate channel is therefore a key strategic decision for smallholders and can significantly influence their income levels, food security, and overall welfare.

Empirical studies (e.g., Mgale & Yunxian, 2020; De Janvry & Sadoulet, 2020) have shown that integration into higher-value marketing channels allows farmers to capture better prices, reduce post-harvest losses, and establish long-term buyer relationships. However, access to these channels is not automatic—it depends on several factors including education, gender, household size, access to credit, ownership of storage facilities, and market satisfaction, among others (Shewaye, 2016; Kiriimi et al., 2013; Megerssa et al., 2020).

In regions such as Oyo State, rice production is extensive, yet farmers continue to face serious market-related challenges. Infrastructure such as roads, rural storage systems, and communication networks remain inadequate, resulting in high transaction costs and poor market integration (Tunde & Adeniyi, 2012). Nonetheless, recent investments in rural infrastructure and cooperative development initiatives have begun to show promise in improving farmers' access to more structured and rewarding markets.

Moreover, emerging innovations, such as digital platforms, cooperative marketing models, and mobile-based information services, are reshaping the landscape of agricultural marketing in sub-Saharan Africa (Pesci et al., 2023; Satyendra et al., 2024). Understanding how smallholders engage with different marketing channels within this evolving environment is crucial for informing effective interventions that promote inclusive and sustainable development.

1.2 Statement of the Research Problem

Agricultural marketing is a critical pillar of Nigeria's rural economy, especially in the southwestern region. It plays a vital role in sustaining rural livelihoods, enhancing food security, and promoting economic development through the efficient distribution and commercialization of farm produce (Awotide et al., 2016). However, despite its acknowledged importance, rural communities across the country continue to grapple with persistent poverty and food insecurity. These enduring challenges point to deep-seated inefficiencies within the agricultural marketing system and highlight the urgent need for more inclusive, transparent, and equitable market structures that can better support smallholder farmers.

Rice, as one of Nigeria's most consumed staple crops, has assumed increasing economic and food security significance due to rising demand fuelled by rapid population growth and changing consumption patterns. Nevertheless, the rice value chain remains riddled with structural inefficiencies. Smallholder farmers, who contribute over 90% of domestic rice production, operate under significant constraints that limit their ability to access profitable markets and benefit from favourable prices (Adeshina et al., 2020). Most of these farmers cultivate less than two hectares of land and face considerable marketing challenges, including high transportation costs, limited access to timely and reliable market information, inadequate post-harvest and storage infrastructure, and a heavy reliance on intermediaries who often exploit their weak bargaining positions (Daramola, 2017).

The marketing channel through which farmers sell their produce is a critical factor that shapes income levels, reinvestment capacity, and overall welfare. Farmers who are confined to selling at the farm gate—typically to itinerant traders or middlemen—often receive significantly lower prices due to a lack of access to more lucrative market alternatives and poor negotiation leverage (Oyedepo & Adekanbi, 2017). This not only limits immediate financial returns but also constrains their ability to reinvest in productivity-enhancing inputs such as improved seeds, fertilizers, and mechanization. Consequently, many smallholder farmers remain trapped in low-yield, low-income cycles, further deepening rural poverty and vulnerability to food insecurity.

Despite the critical role of market participation decisions—including whether to engage in markets, the quantity of produce sold, and the choice of marketing channels—in determining smallholder farmers' economic outcomes, there is a scarcity of empirical research that comprehensively examines these interrelated factors among smallholder rice farmers in Nigeria. While some studies (e.g. Adeoti et al., 2014; Awotide et al., 2016; Donkor et al. 2018; Ojogho & Izekor, 2019; Anthony et al., 2021; Owusu, & İşcan, 2021) have addressed broader aspects of market participation, none have adopted a comprehensive framework that captures the interrelated decisions of whether to participate in markets, how much to sell, and which specific channels to use—such as wholesalers, brokers, or direct millers/processors. Moreover, the impact of these combined decisions on farmers' welfare outcomes, including household income and food security, has not been adequately explored. This gap is particularly pronounced within the unique socio-

economic and infrastructural conditions of Oyo State, Nigeria, where such factors are likely to significantly influence farmers' marketing behaviours and resultant livelihood outcomes.

This study, therefore, seeks to address this gap by identifying the key determinants that influence smallholder rice farmers' decision to participate in rice markets and intensity of participation (quantity sold) as well as determinants of marketing channel choices and evaluating the subsequent effects on their household welfare. By shedding light on these dynamics, the research aims to support evidence-based policy formulation and targeted interventions that can improve farmers' access to efficient and rewarding markets. Ultimately, such insights are essential for informing agricultural development strategies that foster inclusive economic growth, enhance rural livelihoods, and contribute meaningfully to the reduction of poverty and food insecurity in Nigeria.

1.3 Research Questions

This study aims to answer the following research questions:

1. What are the determinants of participation and intensity (i.e., quantity sold)?
2. What factors influence the choice of rice marketing channels among smallholder farmers in Oyo State?
3. How do different marketing channels affect the welfare of smallholder rice farmers, particularly in terms of income and food security?

1.4 Objectives of the Study

The overarching aim of this study is to evaluate the effects of rice marketing channels on the welfare of smallholder farmers in Oyo State, southwestern Nigeria. The specific objectives are to:

1. Identify the determinants of market participation and intensity of commercialisation among smallholder rice farmers.
2. Identify the factors influencing smallholder rice farmers' choice of marketing channels in the study area.
3. Assess the impact of selected marketing channels on farmers' welfare, proxied by net farm income and food security.

1.5 Justification of the Study

The justification for this study lies in the crucial need to improve smallholder farmers' welfare through more efficient and equitable marketing systems, especially in rice production, one of Nigeria's most vital food crops. While the importance of rice in Nigeria's food economy is well recognized, persistent marketing inefficiencies continue to undermine the potential benefits of its production, particularly for smallholder farmers in key producing areas such as Oyo State.

Farmers in these areas face numerous constraints, including poor access to market information, weak bargaining power, high transport costs, and a lack of organized buyer linkages. These issues force them into suboptimal marketing arrangements that diminish their incomes, discourage investment in farm productivity, and perpetuate cycles of food insecurity and poverty. The widespread reliance on informal, exploitative middlemen, due to the absence of viable alternatives, exemplifies the urgent need to restructure and modernize agricultural marketing systems.

Although several studies have examined general aspects of agricultural market access in Nigeria, there is a clear gap in research specifically focusing on the factors influencing marketing channel selection among rice farmers and how these choices affect their income and food security. This knowledge gap limits the ability of policymakers, development practitioners, and researchers to design targeted interventions that respond to farmers' real-world constraints and preferences.

This study addresses this gap by investigating the determinants of marketing channel choices among rice farmers in Oyo State and assessing how these choices influence their welfare. The study focuses not only on demographic and socioeconomic characteristics but also on institutional and market-related variables such as access to credit, ownership of storage, and satisfaction with market prices.

By generating empirical evidence on these relationships, the study can inform the design of agricultural policies, extension programs, and development interventions aimed at enhancing market efficiency and increasing the returns to smallholder farming. Furthermore, the findings can guide investments in rural infrastructure, cooperative development, and market information systems that enable farmers to access more profitable and stable markets.

In addition, the study contributes to broader national goals such as poverty reduction, food security, and rural transformation, as outlined in Nigeria's Agricultural Transformation Agenda and the

Sustainable Development Goals (SDGs). By focusing on welfare outcomes, specifically household income and food security, this research provides actionable insights that can help lift smallholder farmers out of subsistence and into more sustainable, market-oriented livelihoods.

1.6 Significance of the Study

This research is particularly important given the central role of rice in Nigeria's agricultural economy. The rice sector contributes significantly to employment and income generation, supporting various segments of the value chain—from input supply to production, processing, and distribution (Kamai et al., 2020). Western Nigeria, including Oyo State, is one of the country's major rice-producing regions, yet smallholder farmers in these areas remain marginalized by weak infrastructure and market inefficiencies (Food and Agriculture Organization [FAO], 2020).

At the national level, Nigeria faces persistent challenges of food insecurity, unemployment, and rural poverty. As of 2020, around 40% of the population lived below the international poverty line of \$1.90 per day, with rural poverty rates approaching 70% (World Bank, 2020). Hunger affects over 22% of Nigerians, disproportionately impacting agricultural households (FAO, 2020). Enhancing the commercialization of rice farming through efficient marketing strategies is therefore not only an economic imperative but also a development priority.

This study provides practical evidence to guide policy formulation at both state and national levels. Its findings inform how targeted investment in infrastructure, such as feeder roads, rural aggregation centres, storage facilities, and ICT-based platforms, can reduce transaction costs and improve market access for smallholder farmers. It also highlights the importance of institutional support systems (credit, extension, group marketing), offering a framework for scaling up these services through government programs, NGOs, and public-private partnerships.

Moreover, by revealing the gendered dynamics of market access, this research lays the groundwork for gender-sensitive policy interventions aimed at empowering women in agricultural value chains. Importantly, it addresses the generational gap in farming by demonstrating how improved market incentives, digital tools, and cooperative engagement can attract and retain youth in rice production and agribusiness, thus enhancing sustainability and job creation.

Beyond Nigeria, the study has regional relevance for other sub-Saharan African countries facing similar structural challenges in smallholder market integration. Its methodology and findings can serve as a benchmark for designing inclusive and welfare-enhancing agricultural commercialization programs elsewhere.

In summary, this research contributes not only to academic knowledge but also provides actionable insights for stakeholders aiming to transform Nigeria's rice sector into a more inclusive, efficient, and economically viable engine of rural development.

1.7 Operational Definition of Terms

Agriculture: Agriculture refers to the deliberate cultivation of land and the rearing of animals to produce food, fibre, and other essential resources (FAO, 2020). It encompasses a range of practices, including crop farming, animal husbandry, and agroforestry.

Agricultural Sector: This refers to the component of the economy comprising agricultural production activities such as farming, livestock rearing, forestry, and fishing. It plays a fundamental role in Nigeria's economic development by contributing to GDP, employment, and rural livelihoods (World Bank, 2021).

Rice Marketing: The process through which rice is moved from producers to consumers, involving value-added activities such as aggregation, storage, transportation, pricing, and sale. It encompasses both formal and informal marketing systems (Bassey et al., 2013).

Marketing Channel: A marketing channel is the chain of intermediaries and institutions through which a product passes on its way from producers to final consumers. For rice, this includes farmgate buyers, traders, processors, wholesalers, and retailers (Mmbando et al., 2017).

Market Participation Intensity: In this study, market participation intensity refers to the proportion or quantity of maize output that a farming household sells in the market, conditional on having participated in market transactions. It serves as an operational measure of the extent to which households are integrated into the market beyond the initial decision to sell, reflecting the depth of their commercialization (Baiyegunhi & Oppong, 2016).

Welfare Gains: Welfare gains refer to improvements in the socio-economic well-being of individuals or households, such as increased income, food security, and access to services. In agricultural marketing, these gains are linked to more efficient, transparent, and profitable market participation (Fischer & Qaim, 2012; IFAD, 2019).

1.8 Organisation of the Study

Following this introductory chapter, the remainder of this dissertation is organized as follows:

- Chapter Two provides a detailed review of theoretical and empirical literature on rice production and the structure and dynamics of rice marketing channels in Nigeria and other relevant contexts.
- Chapter Three outlines the study area, research design, sampling procedures, and methods of data collection and analysis.
- Chapter Four presents the findings of the research, including descriptive statistics and econometric results, followed by an in-depth discussion of the implications.
- Chapter Five concludes the study with a summary of key findings, recommendations for policy and practice, and suggestions for future research.

1.9 Conclusion

This chapter has laid the foundation for the study by presenting the background, problem statement, research objectives, research questions, justification, and operational definitions of key terms. By focusing on market access and welfare outcomes, the study aims to provide insights relevant to both policymakers and development practitioners. A deeper understanding of these linkages can support the design of targeted strategies to enhance rural livelihoods and promote inclusive agricultural growth.

The next chapter provides a comprehensive review of relevant literature, including theoretical frameworks, empirical studies on rice marketing, and the determinants of marketing channel selection. This review will help situate the current research within the broader academic context and identify knowledge gaps that the study seeks to address.

CHAPTER 2: LITERATURE REVIEW

Introduction

This chapter reviews relevant literature on agricultural commodity marketing, with a particular emphasis on the factors influencing farmers' choice of marketing channels in the rice sector in Nigeria. The review is structured into six sections. The first section introduces decision-making concepts in agricultural contexts. The second section defines marketing and explores the concept of marketing channel choice. The third section discusses the key challenges smallholder farmers face in accessing markets. The fourth section reviews empirical studies on the determinants of marketing channel choices in agribusiness. The fifth section outlines the specific factors that influence farmers' channel decisions. Finally, the sixth section presents the conceptual framework that underpins this study.

2.1. The Concept and Theories of Decision-Making

Decision-making has long been recognized as a foundational concept in management theory and practice. It plays a central role across organizational hierarchies, shaping outcomes at strategic, tactical, and operational levels (Lewis, 2006; Robbins, 2011; Kinicki & Williams, 2013;). Broadly defined, decision-making refers to the process of selecting from among various options based on the decision-maker's objectives, values, and preferences (Fülöp, 2005). From a behavioural science perspective, the process typically entails three main stages: generating multiple alternatives, anticipating potential outcomes, and assessing those outcomes against personal or organizational goals (Hastie & Dawes, 2010).

At its core, decision-making involves establishing a specific objective, analysing available alternatives to that objective, and choosing the most suitable course of action. This aligns with the principles of rational decision-making, which require a clear problem definition, identification of feasible options, and a reasoned selection of the most effective solution. In management literature, decisions are commonly classified according to their nature and frequency. Griffin and Moorhead (2010) and Rosenbloom and Coulter (2012) distinguish between programmed and non-programmed decisions. Programmed decisions are routine, repetitive, and guided by established rules, procedures, and reliable sources of information. They typically follow a structured process

that yields predictable outcomes. In contrast, non-programmed decisions occur in unfamiliar or complex contexts and are often unstructured, lacking clear guidelines or predefined protocols. Characterized by ambiguity in both goals and available information, they demand creative, tailored responses and a higher degree of judgment and flexibility.

2.2 Decision-Making Theories

Decision-making theories have their origins in classical economic thought, where individuals are assumed to act rationally in pursuit of utility maximization (Haidar, 2016). Over time, the concept has been enriched by interdisciplinary contributions, particularly from psychology and sociology, which have expanded the understanding of how decisions are made in practice (Fitzgerald, 2002). These perspectives have led to the development of various models aimed at explaining decision behaviour under differing levels of certainty and complexity.

When choices involve known probabilities, the situation is referred to as decision-making under risk; conversely, when outcomes are uncertain or probabilities are not well defined, the decision is made under uncertainty (Suhonen, 2007). To interpret these scenarios, scholars have distinguished between two broad theoretical perspectives: descriptive theories, which explain how individuals make decisions, and normative theories, which outline how decisions *should* be made under ideal conditions (Roy, 2016). These foundational theories form the conceptual basis for this study.

2.2.1 Descriptive Theories of Decision-Making

Descriptive theories aim to reflect real-world decision-making behaviour, often characterized by bounded rationality, incomplete information, and subjective judgment (Haidar, 2016). Rather than assuming perfect rationality, these models acknowledge that individuals often rely on simplified strategies, such as heuristics—based on past experiences and intuitive reasoning, especially when facing uncertainty (Hastie & Dawes, 2010).

Such approaches emphasize that decisions are not always optimal but are often “good enough” to satisfy immediate needs or constraints, a concept known as satisficing (Dillon, 1998). Empirical studies show that in many cases, individuals bypass comprehensive analysis in favour of intuitive, experience-based decisions (Hastie & Dawes, 2010). Descriptive frameworks include a variety of

models, such as qualitative assessments, heuristic judgments, weighted scoring systems, and experiential cost evaluations (Rosenbloom, 2012).

2.2.2 Normative Theories of Decision-Making

In contrast, normative theories are built on the assumption that decision-makers are fully rational agents with clear preferences, complete information, and the cognitive ability to evaluate all alternatives logically (Suhonen, 2007). These theories prescribe how optimal decisions *should* be made to maximize utility, often drawing from axiomatic systems used in economics, statistics, and decision sciences (Siddique, 2015).

Normative models posit that a rational actor will consistently choose the alternative that yields the highest expected benefit, guided by a clear ranking of preferences and access to precise information (Secchi, 2011). However, critics argue that these models are often impractical due to the unrealistic assumptions they place on human cognitive capacity and data availability (Rosenbloom, 2012). Despite such critiques, normative theories remain influential in domains such as policy analysis, marketing, and economics, where structured decision models are still used to inform strategic planning (Chiamjinnawat, 2017).

2.3 Application of Decision-Making Theories in Agriculture

A substantial body of scholarly literature has applied rational choice theory to examine the determinants of farmers' decisions to adopt agricultural innovations and participate in marketing channels. Rooted in neoclassical economic theory, rational choice theory posits that individuals make decisions by systematically comparing the costs and benefits of available alternatives, ultimately selecting the option that maximizes their expected utility (Dillon & Anderson, 1971; Hardaker et al., 2015). Within the agricultural context, this perspective assumes that farmers evaluate innovations based on their perceived economic returns, risk exposure, and associated transaction costs. For example, Donkor et al., (2018) found that cassava farmers in Nigeria were more likely to participate in marketing channels offering higher profit margins, provided that transaction costs remained manageable. This behaviour reflects economically rational decision-making, whereby farmers aim to optimize income through efficient market engagement.

Similarly, Bello et al., (2021) conceptualized rice farmers as rational economic agents, noting that the adoption of improved rice varieties was primarily driven by the anticipated increases in productivity and income. Such findings reinforce the assumption that adoption occurs when the expected net benefits of innovation surpass those derived from traditional practices (Antle, 1987). Moreover, in contexts involving interdependent or strategic decision-making, such as negotiating access to shared inputs or output markets, game theory has also been employed to analyze farmers' behaviour under competitive or cooperative scenarios (Gauthier, 2021; Nordhaus, 2010). Together, these theoretical frameworks offer a robust lens for understanding how smallholder farmers make economically rational choices in response to dynamic market conditions, institutional structures, and resource constraints.

Beyond technology adoption, rational choice theory has also been applied to assess farmers' participation in rural development initiatives. Awotide et al., (2016), for instance, analysed saving behaviour among rice farmers by framing it as a binary decision, either to save income or to spend it. Their findings suggested that farmers rationally weighed the future benefits of saving against the immediate utility of spending, indicating decision-making processes grounded in utility maximization. In addition, transaction cost theory, often in combination with rational choice theory, has been used to explore how farmers make marketing-related decisions. A study by Bellemare (2012) examined whether farmers chose to engage in oral contracts, formal agreements, or no contracts at all when selling their products. The study concluded that decisions were influenced by perceived profitability, risk exposure, and prevailing market dynamics.

Further evidence from Agbola et al., (2010) showed that smallholder rice farmers in Nigeria are guided by rational expectations when selecting marketing channels. Specifically, farmers preferred to sell their produce in open markets when the anticipated profit exceeded what could be obtained through farmgate sales. These insights underscore the relevance of rational decision-making frameworks in understanding farmers' strategic behaviour regarding innovation adoption, market participation, and resource allocation. This study builds upon these theoretical foundations by applying rational choice theory to investigate the marketing decisions of smallholder rice farmers in Nigeria. It aims to offer evidence-based recommendations for enhancing market access and farmer livelihoods.

2.4 The Concept of Agricultural Marketing

Agricultural marketing is a central pillar of economic transformation in developing countries, including Nigeria, where it plays a key role in increasing rural incomes and reducing poverty (Ejionueme et al., 2014). The marketing of agricultural products encompasses a wide range of activities, actors, and policies that facilitate the efficient distribution of inputs to farms and the movement of agricultural produce to consumers (Schmidt et al., 2011).

Within the broader agricultural value chain, marketing functions are essential for understanding how markets operate, identifying participants, and recognizing barriers that limit the competitiveness of smallholder farmers (Panda & Sreekumar, 2012). Effective marketing systems help manage volatility in supply and demand by facilitating storage and regulating net exports, thereby reducing price fluctuations for both producers and consumers (Pappas, 2016).

A well-structured marketing system also supports the achievement of several Sustainable Development Goals (SDGs), particularly those related to hunger eradication, poverty reduction, and improved livelihoods in rural areas (Abel et al., 2016). By linking remote production zones with urban and peri-urban consumer markets, agricultural marketing enhances food availability and accessibility, thus increasing demand and boosting farmers' incomes (Dey et al., 2023).

Access to stable and transparent markets also serves as a production incentive, encouraging farmers to increase output and invest in improved practices. On the consumer side, it ensures a wider array of food options, contributing to nutritional security and overall welfare. Moreover, agricultural marketing generates employment through value chain activities such as sorting, processing, storage, transportation, packaging, and retailing (Rask et al., 2011), which support broader economic development and job creation.

Importantly, effective marketing systems can also address issues of market inefficiency and exploitation, particularly where information asymmetries exist. When farmers lack access to accurate pricing or demand information, they are more susceptible to exploitation by intermediaries. Transparent, well-regulated markets help to mitigate these risks and empower farmers with better negotiating power (Bonanno et al., 2018).

2.5 Marketing Channel

Marketing channels are a central element of any marketing strategy, playing a pivotal role in facilitating the flow of goods and services from producers to consumers (Nainabasti & Bai, 2009). As emphasized by Van Bruggen et al., (2005), an effective channel strategy is essential for firms to ensure product availability and customer satisfaction. Marketing channels create utility for consumers by providing products at the right time, place, and in convenient forms (Kotler & Keller, 2016). Coughlan et al., (2006) define a marketing channel as a network of independent organizations working collectively to make a product or service accessible for consumption or use.

In the agri-food system, marketing channels represent the routes through which agricultural commodities are transferred from the point of production to the end-user (Abebe, et al., 2016). Each agricultural product often follows a specific channel pathway, tailored to optimize value delivery. McFadden (1986) describe these channels as the "downstream segment" of the value chain, consisting of various actors operating across different nodes where the final goods reach consumers.

2.5.1 Classification and Functions of Marketing Channels

Marketing channels are generally categorized into two broad types: direct and indirect channels, each with distinct characteristics and implications for producers and consumers.

Direct Marketing Channels: A direct marketing channel involves a direct transaction between producers and final consumers, bypassing any intermediaries (Adanacioglu, 2017). Often referred to as a "zero-level" channel (Kotler & Keller, 2018), this model offers producers full control over the marketing process and allows them to retain the entire profit margin (Jobber, 2009).

However, while direct channels can enhance profitability, they also shift the burden of transaction costs—such as transportation, time, and logistics—onto the producer. These costs tend to be disproportionately high for smallholder farmers, making direct marketing less attractive to this group (Barrett, 2008). Consequently, many small-scale farmers avoid direct channels due to limited capacity to absorb these additional costs and challenges associated with reaching final consumers.

Indirect Marketing Channels: In contrast, indirect marketing channels involve one or more intermediaries who facilitate the movement of goods between producers and consumers (Jobber, 2009; Kotler & Armstrong, 2012). These intermediaries—such as middlemen, wholesalers, and retailers—play various roles in aggregating, processing, and distributing agricultural products. However, the inclusion of multiple actors in the chain reduces the share of profits accruing to the producer, as the marketing margins are distributed among all intermediaries involved (Armstrong et al., 2015).

Producers often rely on indirect channels due to limited access to infrastructure, capital, or knowledge necessary for direct sales or value addition. Armstrong et al., (2015) propose a typology of indirect marketing channels, which includes:

- Producer → Retailer → Consumer
- Producer → Wholesaler → Retailer → Consumer
- Producer → Middlemen → Wholesaler → Retailer → Consumer

In the Nigerian context, indirect marketing channels are the predominant model used by smallholder farmers. Most producers engage in farmgate sales, where they sell raw produce with little or no processing. This limits their bargaining power and reduces their earnings, as profits are disproportionately distributed in favour of intermediaries.

2.5.2 Decision-Making on Marketing Channel Choice

Following the ban on rice importation, Nigeria experienced increased market liberalization, creating diverse opportunities for smallholder farmers to market their produce (Obih & Baiyegunhi, 2016). This change granted farmers greater autonomy in choosing marketing channels, each involving different trade-offs related to prices, services, and associated risks—factors that directly impact their income and livelihood outcomes (Kotler & Keller, 2016).

Effective channel selection requires farmers to evaluate the features of available options, including their benefits, requirements, constraints, and potential profitability (Lloyd-Small et al., 2018). Key considerations typically include anticipated output levels and prevailing market prices, which together help assess expected returns (Panda & Sreekumar, 2012). The ability to make informed

choices across marketing channels can enhance income generation, improve investment potential, and support productivity growth (Chen et al., 2014).

However, many Nigerian smallholders continue to rely on intuition and prior experiences due to inadequate access to market information. This often results in the use of suboptimal marketing channels that yield lower prices (Ferris, et al., 2014). Intermediaries or middlemen frequently exploit this information gap, purchasing crops at undervalued prices and reselling them at higher margins to offset their transaction costs and earn profits (Schmidt et al., 2011).

Although participating in structured markets offers substantial economic benefits, several barriers prevent smallholders from doing so. One major issue is the lack of timely and accurate market information, which would otherwise assist in identifying potential buyers and tracking price trends (Jari & Fraser, 2009). Without such insights, farmers are more susceptible to price volatility and negotiation disadvantages (Khapayi and Celliers, 2016).

Additionally, insufficient infrastructure—especially poor road networks and market facilities—hampers farmers' ability to access markets efficiently (African Development Bank [AfDB], 2017). High transportation costs, particularly during the rainy season when many roads become impassable, discourage engagement with distant markets. Furthermore, institutional inefficiencies such as underperforming farmer cooperatives, weak extension systems, and limited access to credit significantly restrict smallholders' market integration (Getahun et al., 2017).

Institutions that provide technical guidance, marketing support, and information on improved technologies are essential to enabling informed decision-making. Nonetheless, many smallholders also struggle with inadequate production capacity due to limited access to essential farming inputs and mechanization. Addressing these limitations by expanding access to modern agricultural technologies and tools can enhance productivity and market-oriented production (Yigezu, et al., 2018).

2.6 Constraints to Market Participation for Smallholder Farmers

Although market engagement holds significant promise for improving rural incomes, smallholder farmers across Nigeria and other developing economies face persistent constraints that limit their

ability to fully participate (Achukwu, 2023). These limitations influence not only their marketing choices but also their overall welfare and economic mobility.

A key constraint is poor access to reliable and timely market information. In remote rural areas, limited communication infrastructure inhibits farmers from staying informed about market dynamics or directly engaging with buyers (Khapayi & Celliers, 2016). Access to such information is critical for improving bargaining power, identifying favourable sales opportunities, and reducing exposure to price uncertainty (Kyaw et al., 2018).

Inadequate infrastructure, particularly road systems, poses another significant obstacle. During the rainy season, poor road conditions make transporting goods to markets both risky and costly. These logistics challenges reduce market participation and often compel farmers to sell at low prices within their immediate localities (Morgan et al., 2019; Kaiser & Barstow, 2022).

Institutional weaknesses also undermine farmers' market involvement. These include poorly functioning farmer organizations, ineffective extension services, and limited access to financial services. Such institutions are meant to support farmers through information dissemination, credit facilitation, and linkages to markets (Ebata & Hernandez, 2017). However, in many cases, these services are insufficient, limiting farmers' ability to engage in profitable production and marketing activities (Assefa & Getachew, 2023).

Finally, smallholder farmers frequently operate with inadequate production resources, which constrains their capacity to produce at commercially viable levels (Von Loeper et al., 2016). Boosting access to improved seeds, fertilizers, tools, and technology is vital to enhancing output, enabling farmers to meet market demands, and fostering inclusive growth (Kirimi et al., 2013; Yigezu, et al., 2018).

2.7 Overview of Market Participation and Channels

Market participation among smallholder farmers is widely recognised as a crucial driver of rural economic transformation in sub-Saharan Africa (Barrett, 2008; Reardon et al., 2019). In this context, market participation refers not only to the act of selling agricultural produce but also to the extent and quality of engagement in different market channels. For many rural households, participation in agricultural markets is a key pathway to increasing income, improving food

security, and enhancing resilience against economic shocks (Pingali, 2007). However, participation levels remain highly variable, shaped by a combination of socio-economic, institutional, and infrastructural factors.

Across sub-Saharan Africa, structural constraints such as inadequate transport infrastructure, high transaction costs, and limited access to market information often reduce farmers' ability to participate in profitable markets (Alene et al., 2008). In Nigeria, these challenges are compounded by post-harvest losses, unstable prices, and weak linkages between producers and buyers (Liverpool-Tasie et al., 2020). As a result, smallholders frequently resort to selling at the farm gate or through informal intermediaries, where bargaining power is limited and farmgate prices are low.

Marketing channel choice plays a pivotal role in shaping farmers' commercialization outcomes. Channels can range from direct sales to consumers, sales through cooperatives, engagement with wholesalers, or participation in contract farming arrangements. Each channel carries distinct advantages and risks in terms of transaction costs, price stability, and market access (Mather et al., 2013). In Nigeria, evidence suggests that the majority of smallholders rely on informal, short supply chains due to limited access to organised markets (Olayemi et al., 2021). Yet, participation in structured value chains, such as those facilitated by cooperatives, aggregation centres, or contract agreements, has been linked to higher prices, reduced marketing risks, and improved household welfare (Abdulai & Birachi, 2009).

Recent policy initiatives, including the Agricultural Promotion Policy (2016–2020) and the Anchor Borrowers Programme, have aimed to improve market integration by strengthening input-output linkages and encouraging formal market participation. Despite these efforts, significant disparities persist in farmers' ability to choose and benefit from different channels, highlighting the need for targeted interventions that address both participation barriers and channel-specific constraints.

By situating the current study within these broader patterns, this subsection establishes the relevance of investigating not only whether farmers participate in markets, but also the factors influencing their choice of marketing channels. This perspective is critical for designing policies

that enable farmers to move into more remunerative channels and fully benefit from commercialization opportunities.

2.8 Empirical Review of Factors Influencing Smallholder Farmers' Choice of Marketing Channels

A growing body of empirical literature has investigated the determinants of marketing channel choices among smallholder farmers. This section presents a critical review of such studies, drawing from diverse geographical and crop contexts, to highlight how various economic, institutional, and demographic factors shape farmers' marketing decisions. These insights form the empirical foundation for this study and identify variables relevant to understanding rice farmers' behaviour in Nigeria.

(i) Economic and Production Factors: Economic considerations, such as farm size, quantity of produce, and transaction costs, consistently emerge as significant determinants of marketing channel selection. Larger production volumes often enable farmers to access more lucrative and formal marketing outlets. For instance, Soe et al., (2015) demonstrated that rice farmers with greater output volumes and access to storage and transport facilities preferred selling directly to rice mills, which tend to offer better prices than intermediaries. Similarly, Mmbando et al., (2016) found that wealth status and transaction costs significantly influenced maize and pigeon pea farmers' marketing choices, with wealthier farmers more likely to engage in formal marketing channels.

(ii) Information Access and Technology Adoption: Access to market information and the use of digital tools have increasingly been recognized as critical facilitators of market participation. Panda and Sreekumar (2012) highlighted that access to timely market information and availability of guaranteed markets encouraged vegetable farmers to select specific marketing outlets. Mauki et al., (2023) further emphasized the role of smartphone ownership and access to extension services in enabling rice farmers to diversify their market outlets, thus improving income stability. These findings underscore the importance of integrating digital solutions and strengthening information dissemination to empower smallholders.

(iii) Institutional and Social Capital: Institutional factors such as cooperative membership, training, and access to credit play vital roles in shaping farmers' marketing behaviours. Anteneh et al., (2011) illustrated how cooperative membership influenced coffee farmers' marketing channel choices in Ethiopia, with cooperative members' decisions affected by satisfaction with cooperative services and secondary payments. The positive role of cooperatives and farmer groups in enhancing bargaining power and reducing transaction costs is further supported by studies such as Maspaitella et al., (2018) and Arinloye et al., (2014), which link cooperative participation to increased access to high-value markets. Social capital, including group membership and extension contact, also facilitates access to market information and resources, thereby influencing marketing decisions (Mmbando et al., 2016). Training and capacity-building initiatives enhance farmers' market awareness and negotiation skills, critical for accessing formal and more profitable channels.

(iv) Market Infrastructure and Accessibility: Physical infrastructure, such as transportation networks and proximity to markets, significantly affects farmers' marketing choices. Soe et al., (2015) found that distance to market increased the likelihood of farm-gate sales through brokers or commission agents, often at lower prices. Conversely, better infrastructure and storage facilities encouraged direct sales to processing units. The findings of Panda and Sreekumar (2012) also stress the role of adequate transportation and market facilities in enabling farmers to reach preferred outlets.

(v) Behavioural and Risk Considerations: Beyond structural factors, behavioral aspects such as urgency for cash, payment terms, and risk of post-harvest losses influence marketing decisions. Siddique et al., (2017) showed that citrus farmers' channel preferences were shaped by payment reliability and potential losses, highlighting the need to consider farmers' risk perceptions and cash flow requirements in marketing interventions.

(vi) Role of Informal Markets: Informal markets remain a dominant and accessible avenue for many smallholder farmers, especially those with limited access to formal channels. Zivenge and Karavina (2012) demonstrated that informal markets were more accessible and attractive to tomato farmers in Zimbabwe, with produce price being the critical factor influencing choice. These

markets provide vital opportunities for communal and resource-poor farmers, suggesting that interventions to formalize and improve informal market structures could enhance their benefits.

(vii) Collective Marketing and Market Linkage Innovations: Innovative institutional arrangements, such as collaborative aggregation and marketing strategies, have also been explored as mechanisms to improve smallholder farmers' access to high-value markets. Schmidt et al., (2011) presented a case study of a cooperative aggregation and distribution initiative in the United States that linked local farmers to institutional markets. The study highlighted how collaborative marketing not only increased farm incomes but also improved food access within local communities. Key success factors included shared logistics, centralized coordination, and a clear value proposition to both producers and buyers. While the context differs from typical rural agricultural economies in Africa, the underlying principle—that collective marketing models can reduce transaction costs and expand market access—resonates with findings from studies in developing countries (e.g., Arinloye et al., 2014; Anteneh et al., 2011). These insights reinforce the potential of cooperative-driven and institutionally supported marketing systems in enhancing smallholder commercialization and resilience.

2.9 Conceptual Categorization of Factors Affecting Marketing Channel Choice in Agribusiness

Building on the empirical evidence presented in the preceding section, this section offers a conceptual framework for categorizing the main determinants of marketing channel choices. Organizing these factors into distinct categories—demographic, farm-related, transactional, and institutional—helps clarify their roles and interactions in influencing smallholder marketing decisions. This structured categorization also guides the selection of variables for the empirical analysis in this study.

The marketing decision-making process for farmers typically begins with input procurement and culminates in the sale of agricultural produce. A variety of factors influence these decisions, particularly concerning which marketing channels farmers choose to access. Understanding these determinants is essential for designing efficient marketing systems, promoting smallholder participation, and enhancing farm profitability (Schmidt et al., 2011). Such knowledge can inform policies aimed at integrating smallholder farmers into reliable and profitable market networks.

Although several studies have explored the determinants of farmers' marketing channel choices in developing countries, relatively few have focused on rice farmers in Nigeria. While rice may exhibit crop-specific traits, many of the factors influencing marketing channel selection are consistent across various agricultural products. Extending this research to different crops and regions across Africa is necessary for a broader understanding of the challenges and opportunities in agribusiness marketing.

Empirical studies categorize the factors affecting marketing channel choice into four main groups: (i) farmer demographic characteristics, (ii) farm and asset-related factors, (iii) transactional or marketing costs, and (iv) institutional factors.

2.9.1 Farmer Demographic Characteristics

Demographic variables such as age, gender, education, household size, and farming experience significantly influence farmers' decisions regarding marketing channel selection.

- **Age:** Older farmers often prefer formal markets, as informal market negotiations may be time-consuming and strenuous (Donkor et al., 2023; Legesse et al., 2024).
- **Education:** Literacy enhances the ability to interpret market signals, prices, and buyer conditions. Educated farmers are more likely to engage with private traders offering better returns (Ibikoule et al., 2024; Chikhawo et al., 2024).
- **Gender:** Market orientation can differ by gender. Male farmers are more likely to bypass cooperatives in favour of private markets (Kyaw et al., 2018; Legesse et al., 2024).
- **Household Size:** Larger households often benefit from family labour, enabling them to transport produce more efficiently and access more distant, often more profitable, markets (Thamthanakoon et al., 2021; Belete and Nigatu, (2023).

2.9.2 Farm Characteristics and Asset Endowment Factors

Farm-specific factors such as land size, off-farm income, and asset ownership (e.g., transport equipment, mobile phones) are critical in determining access to and selection of marketing channels.

- **Farm Size:** Larger farms tend to produce marketable surpluses and possess stronger bargaining power, allowing them to participate in formal or urban markets (Zhang et al., 2019; Endris et al., 2020; Donkor et al., 2021).
- **Off-farm Income:** Income from non-farming sources facilitates transport and information access, expanding marketing options (Mmbando et al., 2016 Mbitsemunda & Karangwa, 2017).
- **Asset Ownership:** Tools such as mobile phones improve access to real-time price information. Ownership of vehicles, bicycles, or motorcycles enhances mobility and reduces dependency on intermediaries (Nwafor, 2021; Degefa et al., 2022).

2.9.3 Transactional and Marketing Costs Factors

According to New Institutional Economics (NIE), transaction costs are critical barriers to market participation. These include the costs associated with acquiring information, negotiating with buyers, monitoring transactions, and enforcing agreements (Mmbando et al., 2016).

- **Market Distance and Road Infrastructure:** Poor Road conditions and long distances increase transport costs, often compelling farmers to sell at the farm gate at reduced prices (Chiv et al., 2020; Ibikoule et al., 2024).
- **Market Information Access:** Limited access to timely and accurate information increases transaction costs and reduces farmers' bargaining power (Donkor et al., 2021).
- **Product Price:** Farmers gravitate toward channels offering higher prices, consistent with supply theory (Ibikoule et al., 2024). Urban markets often provide higher returns than local or rural ones.

2.9.4. Institutional Factors

Institutional support, such as access to credit, extension services, and participation in farmer associations, plays a crucial role in improving market access and efficiency.

- **Credit Access:** Enables farmers to invest in inputs, hire transport, and take advantage of better markets (Mgale & Yunxian, 2020; Donkor et al., 2021).
- **Extension Services:** Provide technical knowledge and market insights that influence marketing decisions (Sibiza et al., 2011).

- **Farmer Associations:** Facilitate collective marketing, reduce transaction costs, and increase bargaining power (Maspaiteella et al., 2018; Olwande et al., 2015). These associations also enable access to distant markets and modern buyers, including processors and exporters.

2.10 Synthesis and Implications

Overall, the literature indicates that smallholder farmers' marketing channel choices are influenced by a dynamic combination of production capacity, access to information and technology, institutional support, infrastructural availability, and behavioral factors. Policies and programs aimed at improving market access must therefore adopt a multi-dimensional approach that simultaneously strengthens physical infrastructure, enhances information flow, fosters cooperative formation, and supports capacity building. In particular, digital tools and mobile technologies emerge as promising avenues to bridge market information gaps, while cooperative organizations play a crucial role in reducing transaction costs and improving bargaining power. At the same time, recognizing the continuing importance of informal markets and tailoring support to improve their efficiency can facilitate inclusive agricultural development.

Across these studies, the multinomial and binary logit regression models were the predominant analytical tools due to their ability to handle categorical outcomes with multiple alternatives. The logit models' simplicity and interpretability made them particularly suitable for analysing marketing channel choices. Some studies also employed Tobit and Probit models for similar purposes. Common explanatory variables across the empirical literature include:

- **Demographic factors:** age, gender, household size, and education level.
- **Farm characteristics:** farm size, ownership of assets (e.g., livestock, TV, radio), and off-farm income.
- **Institutional access:** membership in farmer organizations, access to credit, and extension services.
- **Transaction costs:** transport costs, distance to markets, and access to timely market information.
- **Product features:** product type, output price, and perishability.

Most empirical studies emphasized the role of smallholder farmers in agricultural development and market integration in developing economies. However, several notable limitations and gaps persist in the existing body of work. Firstly, much of the literature relies on cross-sectional data and basic econometric models, which constrain the ability to understand the dynamic or causal relationships between marketing decisions and farmer welfare outcomes. Secondly, there is often inconsistency in variable definitions and measurement approaches, making it difficult to compare findings across studies or regions. Thirdly, while the majority of studies focus on perishable and high-value crops like vegetables, fruits, and dairy, there is limited empirical attention to staple crops such as rice, especially in non-Northern regions of Nigeria. Moreover, many studies primarily examine household-level characteristics, often overlooking broader institutional and structural constraints, such as local market regulation, policy support systems, and infrastructure quality. Lastly, gender and intra-household decision-making dynamics—although relevant—are frequently underexplored.

These gaps highlight the need for context-specific, methodologically rigorous research that captures the complexity of marketing decisions and their outcomes in staple crop systems. This study seeks to fill part of that gap by focusing on rice farmers in Oyo State, Nigeria, and employing a comprehensive analytical framework to identify the key determinants of marketing channel choice and assess their implications for smallholder welfare.

2.11 Conclusion

This chapter has critically reviewed key theories, concepts, and empirical studies related to marketing channel choices among smallholder farmers. While existing literature provides valuable insights into the demographic, farm-level, transactional, and institutional factors influencing farmers' decisions, notable gaps persist—particularly concerning rice farmers in Nigeria. These gaps underscore the need for targeted empirical research to better understand the complex interactions among these determinants across different socio-economic and agro-ecological settings. Furthermore, there is limited evidence on the long-term impacts of interventions aimed at shaping marketing channel choices. Addressing these issues is essential for designing effective policies and support mechanisms. The next chapter presents the research methodology developed to investigate these gaps and contribute to a deeper understanding of marketing channel selection in the context of smallholder rice farming in Nigeria.

CHAPTER 3: RESEARCH METHODOLOGY

Introduction

This chapter outlines the research methodology used to achieve the study's objectives. It discusses the guiding research philosophy, detailed methods, and procedures, including the study area, population, sampling strategy, and data collection techniques. The conceptual and analytical frameworks, along with the empirical estimation model, are also presented. Considerations of ethics, validity, and reliability are addressed, as well as potential limitations. The chapter concludes with a summary highlighting the key methodological elements.

3.1 Research Philosophy and Approach

This study adopts a multi-paradigmatic philosophical stance, drawing from positivism, interpretivism, and pragmatism to accommodate its complex objectives. These orientations offer complementary perspectives on the socio-economic behaviours of rice farmers and the measurable patterns underlying their marketing channel choices.

Positivism underpins the study's quantitative dimension. It assumes an objective reality that can be observed and measured. This justifies the use of structured data, statistical modelling, and hypothesis testing to examine cause-and-effect relationships.

At the same time, interpretivism acknowledges that farmers' behaviours are also shaped by social and cultural contexts. This paradigm supports the use of qualitative methods to understand beliefs, motivations, and lived experiences that quantitative data alone may not capture.

Pragmatism bridges these paradigms by emphasizing practical outcomes and real-world application. It justifies the integration of both qualitative and quantitative approaches, reflecting the study's goal of generating actionable insights for policy and rural development. As noted by Saunders et al. (2019), pragmatism accepts that reality is both objective and socially constructed, and that values influence research interpretation. While realism is acknowledged, recognizing that reality exists independently but is perceived through social filters, it is not the primary orientation guiding this study.

The research adopts a descriptive design to systematically explore the factors influencing rice farmers' choice of marketing channels in Oyo State, Nigeria. It follows a deductive approach,

testing existing theories using empirical data, progressing from general concepts to specific observations (Johnson et al., 2020).

3.2 Research Design

The choice of research design is shaped by the study's objectives, the researcher's expertise, and the intended audience (Clark & Creswell, 2014). Research strategies generally fall into three categories: quantitative, qualitative, and mixed methods. Quantitative designs, typically aligned with deductive reasoning, focus on testing theories through numerical data and statistical analysis (Bhattacharjee, 2012). In contrast, qualitative approaches—more aligned with inductive reasoning—seek to explore meaning and context, often using flexible data collection and thematic analysis to develop theoretical insights.

While quantitative research is often seen as more objective (Martin & Bridgmon, 2012), critics argue it can limit participant expression (Wilson, et al., 2018). To address this limitation, mixed methods designs are increasingly favoured, as they combine the strengths of both approaches, offering deeper and more validated insights (Creswell, 2014). Given the study's aim to evaluate and explain factors influencing rice farmers' marketing choices, a quantitative survey design—a common method in deductive research—is adopted. Survey research provides a systematic way to gather data from a representative sample, enabling statistical generalization of trends, opinions, and behaviours (Leavy, 2017; Creswell, 2014).

The primary data collection tool is a structured questionnaire, delivered through face-to-face interviews. While online and postal surveys offer broader reach and lower costs, they may suffer from low response rates and misunderstandings (Creswell & Creswell, 2018). In this study, direct interviews were preferred due to participants' limited literacy and language barriers. Interviewers translated and explained questions in the local language, ensuring clarity and higher response accuracy. This design supports the study's objective by enabling the collection of standardized, analysable data to identify key determinants of paddy rice farmers' marketing channel choices in Nigeria.

3.3 Description of the Study Area

Akinyele Local Government Area (LGA) is one of the thirty-three LGAs in Oyo State, located in southwestern Nigeria. It occupies a land area of approximately 432.2 km² and had an estimated population of 302,700 people as of 2022, with a population density of around 700 persons per square kilometre and an annual growth rate of 2.3% since 2006 (NBS, 2022). The demographic growth reflects Akinyele's rising importance in agricultural production and its growing contribution to regional food security and livelihoods.

The selection of Akinyele LGA for this study is deliberate, based on its recognized role in agricultural development, particularly in smallholder rice production. Recent studies (Adeshina, et al., 2020; Oladeji et al., 2024; Oduntan, 2024) have identified rice farming as one of the prominent agricultural activities in the area, driven by favourable environmental conditions and increasing market opportunities. Communities such as Moniya, Alabata, Ijaye, and Olorisaoko are particularly known for lowland rice cultivation, which benefits from adequate rainfall and accessible irrigation points, including seasonal streams and small dams. Smallholder rice farmers in these communities form a critical segment of the local agricultural economy and supply chain.

Akinyele LGA lies within the tropical rainforest agro-ecological zone, characterized by a bimodal rainfall pattern ranging from 1,200 to 1,500 mm per annum, and an average temperature range of 24°C to 32°C. These climatic conditions enable the cultivation of multiple crops, including rice, maize, cassava, yam, and vegetables, across wet and dry seasons. This ecological advantage enhances the sustainability of farming systems in the area, allowing farmers to diversify income sources while contributing to household food security.

Beyond its agro-climatic suitability, Akinyele LGA benefits from strategic proximity to urban markets in Ibadan, the Oyo State capital. This proximity fosters greater commercialization of agriculture, access to input suppliers, and participation in formal and informal marketing channels. Furthermore, the area has received attention from both government and development partners through initiatives such as the Anchor Borrowers' Programme (ABP) and support from the Oyo State Agricultural Development Programme (OYSADEP), aimed at improving productivity and market integration for rice farmers. Akinyele's socioeconomic and infrastructural diversity, along with its dynamic agricultural landscape, makes it an appropriate site for studying market

participation, marketing channel choices, and welfare outcomes among smallholder rice farmers. Figure 3.1 presents a map of Oyo State, indicating the location of Akinyele LGA as the study area.

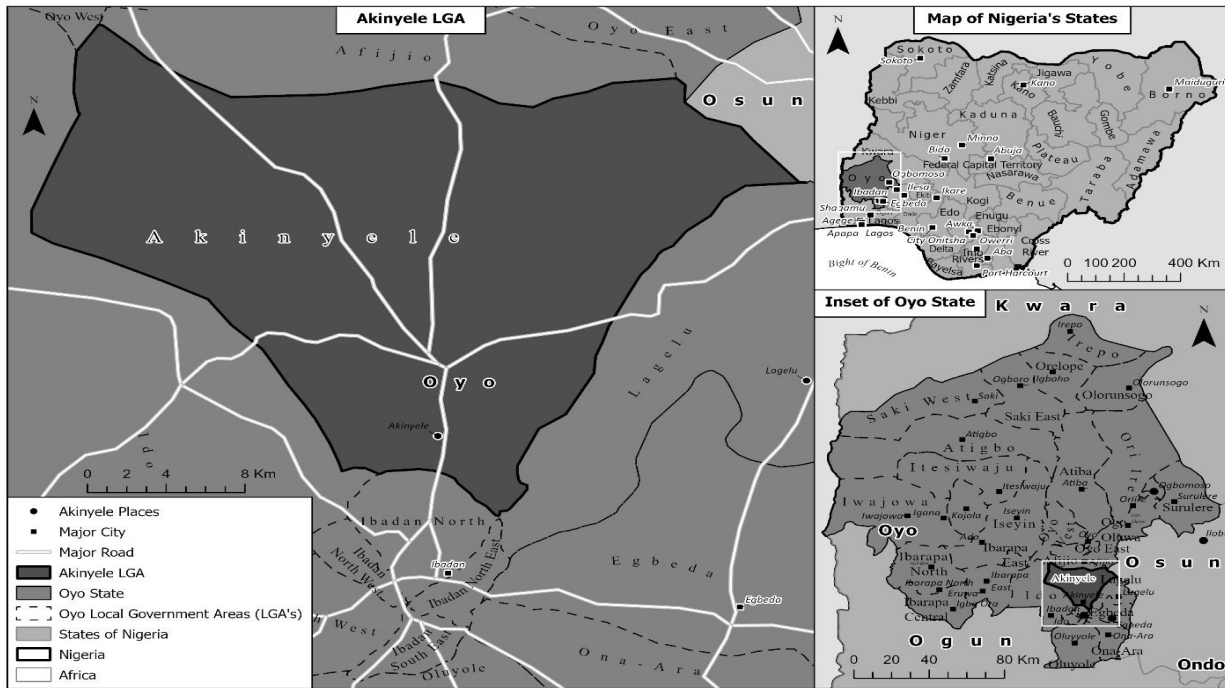


Figure 3.1: Map of Oyo State showing the study area - Akinyele Local Government Area.

3.4 Sampling Approach and Sample Size

Following the sampling design outlined in Section 3.4, the data collection process was strategically organized to ensure both representativeness and data quality. A multi-stage sampling approach was adopted to capture the heterogeneity of smallholder rice farmers across varying market access levels and infrastructural conditions in Akinyele Local Government Area (LGA) of Oyo State. This design was chosen because it allows for purposive selection of relevant geographic units followed by random selection of individuals within those units, thus balancing targeted focus with statistical representativeness.

The study area was purposively selected based on Akinyele’s recognized importance as a major rice-producing LGA (OYSADEP, 2023), ensuring the sample reflects core production zones. Within Akinyele, four wards—Ijaye, Olorisaoko, Moniya, and Alabata—were purposively chosen for their accessibility to transportation networks and proximity to major markets, characteristics critical for analyzing market participation and welfare outcomes.

Within each ward, comprehensive lists of active smallholder rice farmers were obtained from local agricultural extension officers and farmer group leaders. These lists formed the sampling frames for the study. The total known population of rice farmers across the selected wards was 785 individuals. This information provided a reliable basis for probabilistic sampling, ensuring that the sample drawn was representative of the target population.

To determine the sample size, Cochran's formula (1977) was applied because it is a widely accepted statistical method for calculating sample sizes when estimating proportions, particularly suited to situations where the population size is known or finite. This method allows for control over confidence level, margin of error, and variability. The formula for an infinite population is as follows:

$$n_0 = \frac{Z^2 \cdot p \cdot (1-p)}{e^2} \quad (3.1)$$

Where n_0 is the initial sample size for an infinite population; Z is the z-value corresponding to the desired confidence level (1.96 for 95%); p = estimated population proportion (0.5, assuming maximum variability) and e = margin of error (set at 0.06 or 6%). Substituting the values into the formula:

$$n_0 = \frac{(1.96)^2 * 0.5 * (1-0.5)}{(0.006)^2} = \frac{3.8416}{0.0036} * 0.25 \approx 268 \quad (3.2)$$

Given the population of 785 rice farmers, the finite population correction was applied to adjust the initial sample size estimate to 200 respondents, balancing statistical rigor with practical constraints. This approach guarantees that the sample is sufficiently powered to detect meaningful differences in marketing behaviours and welfare outcomes.

$$n = \frac{n_0}{1 + \left(\frac{n_0 - 1}{N}\right)} = \frac{268}{1 + \left(\frac{267}{785}\right)} = \frac{268}{1.3401} \approx 200 \quad (3.3)$$

Therefore, the final sample size for this study was 200 respondents, calculated to achieve a 95% confidence level, a 6% margin of error, and 50% variability. Farmers were then randomly selected from the lists in proportion to their distribution across the wards, using random number generation methods to avoid selection bias and ensure fair representation. This combination of purposive geographic selection followed by random individual sampling constitutes a robust multi-stage sampling design tailored to the study's objectives.

3.5 Questionnaire Development

To achieve the study's objectives, a structured questionnaire was developed to collect primary data from smallholder rice farmers. The instrument primarily comprised closed-ended questions to ensure consistency, facilitate efficient data capture, and enable quantitative analysis. The design process followed a three-stage approach: (i) drafting the initial questionnaire, (ii) conducting a pilot survey, and (iii) refining the instrument based on feedback.

The initial draft was informed by existing literature on market participation and marketing channel selection among smallholder farmers (e.g., Mmbando et al., 2016; Asfaw et al., 2020; Maspaitella et al., 2020; Donkor et al., 2021; Ibikoule, et al., 2024; Legesse et al., 2024). Prior to data collection, the questionnaire was pre-tested with 30 farmers from a neighbouring community outside the main study area. The pre-test assessed the clarity, relevance, and reliability of the questions, and informed necessary refinements to ensure contextual appropriateness. Farmers who participated in the pre-test were excluded from the final study sample. Feedback from the pre-test, which involved three extension officers and one agricultural district director, led to revisions that enhanced the questionnaire's reliability and validity. The finalized instrument was organized into the following sections:

- **Section A:** Socio-demographic characteristics (e.g., age, gender, education, household size, farming experience, and off-farm activities).
- **Section B:** Farm characteristics and household assets, including landholding, ownership of livestock, and durable assets such as vehicles and communication tools.
- **Section C:** Institutional and support services (access to credit, extension services, and group membership).

- **Section D:** Marketing and transactional attributes (marketing channels used, transaction costs, price received, payment terms, and market information access).

3.6 Ethical Consideration

This study received ethical clearance from the University of KwaZulu-Natal's Humanities and Social Sciences Research Ethics Committee (Protocol Reference: HSSREC/00007935/2024) and was classified as low risk. All procedures complied with institutional guidelines for research involving human participants, with particular attention to participants' rights, safety, and confidentiality. Participation was fully voluntary, and respondents were informed of their right to withdraw at any stage without consequence. Before data collection, written informed consent was obtained through a signed consent form detailing the study's objectives, procedures, and measures for privacy protection. Confidentiality was strictly maintained, with all data anonymized and used solely for academic purposes. No personally identifiable information was disclosed, and no incentives were provided to prevent undue influence on participation.

A gatekeeper's letter was secured from the Oyo State Secretariat to authorize data collection in the study area, ensuring compliance with local administrative protocols. The research adhered to key ethical principles:

- **Beneficence:** Maximizing benefits while minimizing harm.
- **Respect for persons:** Ensuring informed consent, autonomy, and dignity.
- **Justice:** Promoting fairness and equitable participation.

The study upheld integrity in data collection, analysis, and reporting, in full accordance with university and national ethical standards.

3.7 Data Collection

A mixed-methods approach was employed to collect rich and comprehensive data, combining quantitative and qualitative techniques. To address challenges posed by the generally low literacy levels in the study population, all questionnaires were administered face-to-face by trained enumerators fluent in English and Yoruba, the dominant local language. This method facilitates inclusive participation, allows probing, and helps observe non-verbal cues, thereby improving data quality and reducing response errors (Levy & Lemeshow, 1991; Kumar, 2005).

Prior to the main data collection, a pilot test was conducted in a rice-farming community within Akinyele LGA that was not included in the final sample. This pre-test involved administering approximately 20 questionnaires to identify ambiguities and logistical challenges, which were addressed by refining question wording, sequencing, and structure. Feedback from this pilot informed final adjustments to improve clarity and reliability.

Enumerators underwent intensive training on ethical research conduct, interview techniques, and standardized data recording procedures. Fieldwork was closely supervised by the research team to maintain data integrity and adherence to protocols. All participants provided informed consent after being briefed on the study's objectives and assured of confidentiality. This ethical approach ensured respect for respondents and compliance with research standards.

3.8 Data Analysis

Upon completion of data collection, the dataset underwent thorough cleaning to address missing values, detect outliers, and correct inconsistencies, thereby ensuring accuracy and reliability. Subsequently, all responses were systematically coded, converting qualitative entries into numerical values in accordance with the variable types (nominal, ordinal, interval, or ratio), as recommended by Bhattacharjee (2012). This coding process facilitated efficient statistical processing and interpretation.

The cleaned and coded data were initially entered and managed using SPSS software. Descriptive statistics were employed to summarize respondents' demographic characteristics, farm profiles, and institutional variables. For inferential analysis, a range of econometric techniques was applied using both SPSS and STATA software to address the specific objectives of the study. These included:

- **Double Hurdle (DH)** model, to examine factors influencing both the decision to participate and the intensity of market participation.
- **Multinomial Logit (MNL)** model, to analyse determinants of marketing channel choice.
- **Multinomial Endogenous Switching Regression (ESR)** model, to assess the impact of market channel on welfare outcomes such as household income and food security.

This multi-method analytical approach enabled both behavioural modelling and counterfactual impact estimation in line with the conceptual and theoretical frameworks of the study.

3.9 Theoretical Framework

This study is grounded in three complementary theoretical perspectives that collectively explain smallholder farmers' market participation behaviour, marketing channel choices, and the resultant impact on household welfare: Transaction Cost Economics, the Random Utility Model, and the Agricultural Household Model.

3.9.1 Transaction Cost Economics (TCE)

Originally developed by Coase (1937) and later expanded by Williamson (1985), Transaction Cost Economics provides a framework for understanding how the costs associated with market exchanges influence economic decisions. In agricultural markets, transaction costs may include transportation expenses, time spent searching for buyers, negotiating prices, or dealing with contract enforcement. These costs are often prohibitively high for smallholder farmers in developing countries due to infrastructural constraints, limited access to market information, and institutional weaknesses.

According to TCE, farmers will participate in markets and select marketing channels that minimize these costs while maximizing returns. Hence, households with better market access, access to extension services, or group membership (e.g., cooperatives) are more likely to engage in output markets and choose more efficient channels.

3.9.2 Random Utility Model (RUM)

The Random Utility Model, as developed by McFadden (1974), is used to explain discrete choice behaviour under uncertainty. It assumes that individuals choose among a set of mutually exclusive alternatives based on the expected utility derived from each option. The choice of marketing channels by farmers, such as selling at the farm gate, through middlemen, or via cooperatives, can be understood within this framework.

The RUM posits that a farmer will choose the marketing channel that offers the greatest utility, which may be influenced by factors such as price offered, reliability of the buyer, speed of

payment, transaction costs, and risk associated with each channel. The multinomial logit model, grounded in the RUM, is commonly employed to analyse such discrete choice problems.

3.9.3 Agricultural Household Model (AHM)

The Agricultural Household Model (Singh, Squire & Strauss, 1986) integrates production and consumption decisions within a single framework. It recognizes that smallholder farmers in developing countries often consume a portion of their production and face imperfect or missing markets. In such settings, market participation is not solely a profit-maximizing decision, but also one shaped by household consumption needs, risk preferences, and liquidity constraints.

Participation in agricultural markets can thus have important welfare implications. Increased market participation can lead to higher income, improved access to food, and better overall household welfare. Conversely, exclusion from markets may perpetuate poverty and food insecurity. This study adopts the AHM to assess the impact of market participation on welfare indicators such as household income and food security. Together, these theories provide a comprehensive lens for analysing the determinants and consequences of market participation and channel selection among smallholder rice farmers, in grounded in the RUM, and is commonly employed to analyse such discrete choice problems.

3.10 Conceptual Framework

The conceptual framework for this study outlines the hypothesized relationships among key constructs: farmer and farm characteristics, market participation, marketing channel choice, and welfare outcomes. It integrates theoretical insights into a sequential empirical strategy suited to the behaviour of smallholder rice farmers in the agricultural marketing process.

The framework is built on a sequential decision-making model. In the first stage, smallholder rice farmers decide whether to participate in the market—that is, whether to sell their rice. This decision is shaped by a range of factors, including socio-economic characteristics (such as age, gender, and education), farm-specific attributes (such as farm size and yield), institutional factors (such as access to extension services, credit, and cooperative membership), and market access indicators (such as proximity to markets and access to marketing information).

In the second stage, conditional on participating in the market, farmers must choose a specific marketing channel. These options may include selling to wholesalers, brokers, or directly to millers/processors. The selection of a marketing channel is influenced by expected utility, shaped by factors such as price offered, transaction costs, reliability of buyers, and payment terms.

Both the decision to participate in the market and the choice of marketing channel are expected to have implications for household welfare. In this study, welfare is assessed through two primary indicators: household income and food security. Market participation via different marketing channels may enhance welfare by improving income levels, ensuring more stable cash flow, and strengthening linkages to services and inputs. However, because farmers self-select into market participation and channel choice based on both observed and unobserved characteristics, these decisions may be endogenous to welfare outcomes. However, since farmers self-select into market participation and channel choice based on both observed and unobserved characteristics, these decisions may be endogenous to welfare outcomes. To address this potential endogeneity, the empirical strategy is structured in three stages:

- First, a Double Hurdle Model is employed to estimate the probability and extent of market participation across all sampled households.
- Second, for those who participate, a Multinomial Logit Model is used to identify the determinants of marketing channel choice.
- Third, a Multinomial Endogenous Switching Regression (MESR) model is applied to estimate the impact of market channel on net income and food security, correcting for possible selection bias.

This multi-stage framework provides a robust and consistent approach for analysing smallholder farmers' market behaviour and its welfare implications, aligning empirical methods with the study's conceptual foundation. Figure 3.1 presents a diagrammatic representation of the conceptual framework.

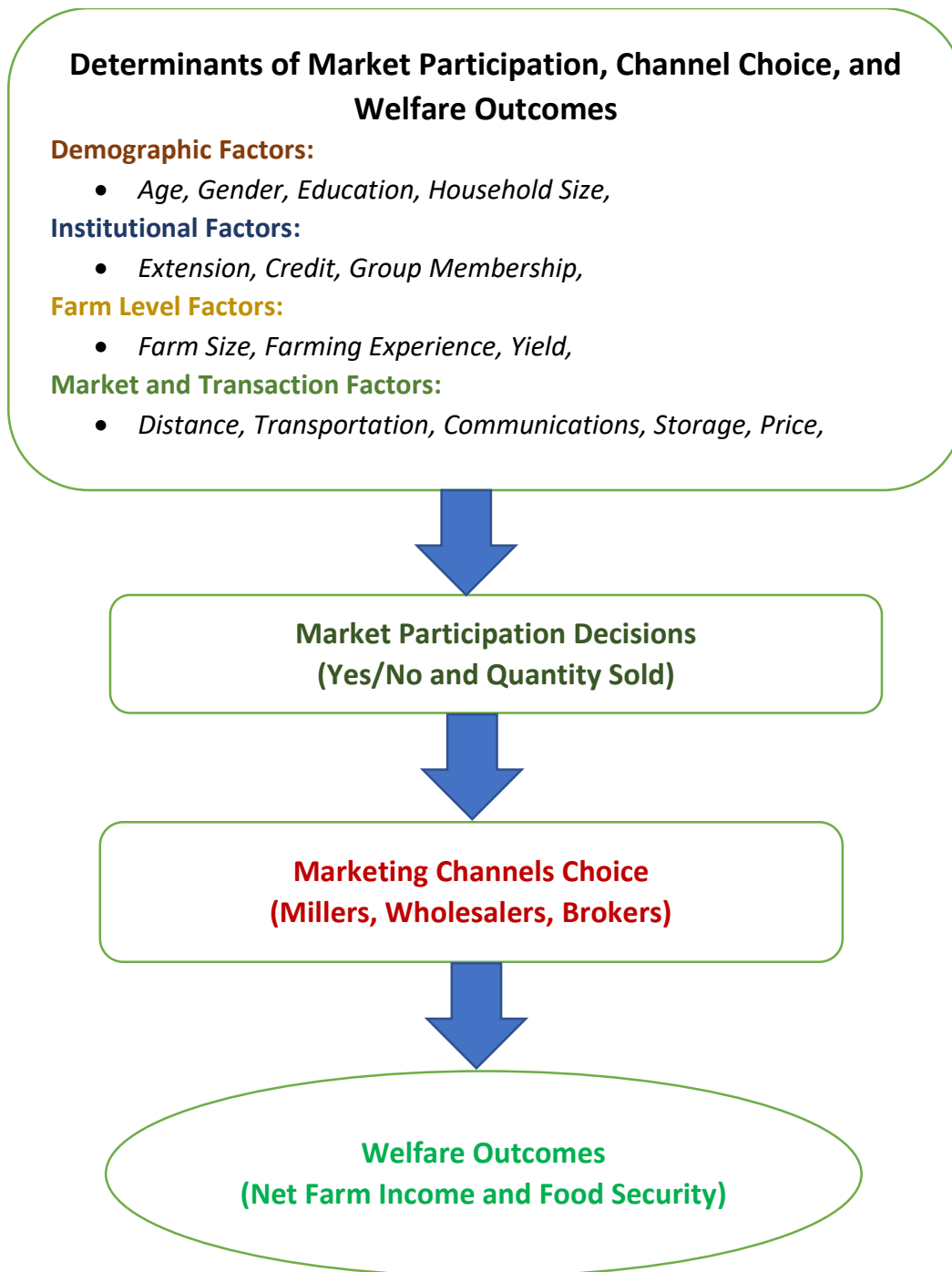


Figure 3.2: Conceptual Framework of Market Participation, Channel Choice, and Welfare Impact.

Source: Author's construct, 2025.

3.11 Specification of Econometric Models and Analytical Techniques

To address the study's objectives, both descriptive and econometric methods were employed. Descriptive statistics summarized key socio-economic and institutional characteristics of the sampled households. A three-stage econometric approach was then adopted, comprising the Double Hurdle model, the Multinomial Logit (MNL) model, and the Multinomial Endogenous Switching Regression (MESR) model. These models were used to analyze: (i) the determinants and intensity of market participation, (ii) the factors influencing marketing channel choice, and (iii) the impact of marketing channel choice on household welfare outcomes, specifically net farm income and food security. The models were selected to address distinct but interrelated research questions, enabling a comprehensive analysis of smallholder rice farmers' market behavior and welfare. All analyses were conducted using STATA 17 and SPSS 28.

3.11.1 Double Hurdle Model

In empirical research, decision-making and outcome processes are often modelled using a two-step analytical approach. This is particularly appropriate when analysing the quantity of rice marketed by smallholder farmers, which involves two distinct but interrelated decisions: the initial (unobserved) decision to participate in the market (i.e., to sell rice) and the subsequent (observed) decision regarding the actual quantity sold.

The key econometric challenge arises from the fact that the quantity sold is observed only for a non-random sub-sample—those who choose to participate in the market. This implies that the second-stage outcome (quantity sold) is conditional on the first-stage decision to sell. If one estimates the quantity sold based only on the sub-sample of market participants without correcting for this selection process, the estimates are likely to be biased and inconsistent. This is because the error term in the outcome equation may be correlated with the unobserved factors influencing the decision to participate, thus violating the assumption of random sampling required for unbiased Ordinary Least Squares (OLS) estimation (Wooldridge, 2003).

To address this issue, the Double Hurdle Model, originally proposed by Cragg (1971), is employed. This two-step framework corrects for potential selection bias and has been applied in related contexts by authors such as Asfaw et al., (2022) and Chikhawo et al., (2024). The model consists of the following two stages:

- First Hurdle – Market Participation Decision

A Probit model is used to estimate the probability that a farmer participates in the rice market. This decision is modelled as a function of both socio-economic and farm-level characteristics, as well as one or more exclusion restriction variables that affect participation but not the quantity sold directly (Wooldridge, 2003). The latent utility from market participation is represented as:

$$y_i^* = \alpha' z_i + e_i \quad e_i \sim N(0,1) \quad (3.4)$$

Where y_i^* is a latent variable representing the farmer's utility from selling rice; z_i is a vector of explanatory variables, α is a vector of parameters to be estimated, $e_i \sim N(0,1)$ is the normally distributed error term. The observed participation decision is:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (3.5)$$

The Probit probability is then given by:

$$\Pr(y_i = 1 | z_i, \alpha) = \Phi(h(z_i, \alpha)) + e_i \quad (3.6)$$

where Φ denotes the standard normal cumulative distribution function.

- Second Hurdle – Quantity of Rice Sold

For households that participate in the market ($y_i = 1$), the second stage models the quantity of rice sold. To correct for the potential selection bias, the Inverse Mills Ratio (IMR) derived from the first-stage Probit model is included as a regressor. The second-stage outcome equation is specified as:

$$G_i^* = \beta' x_i + \gamma \hat{\lambda}_i + u_i, \quad u_i \sim N(0, \sigma^2) \quad (3.7)$$

Where G is the quantity of rice sold, x is a vector of explanatory variables affecting market participation, β is the vector of the corresponding coefficients to be estimated. λ is the inverse Mills' ratio to account for sample selection in quantity analysis; γ is the associated parameter to be estimated, and u_i is the error term, assumed to be distributed normally with zero mean and unit variance σ^2 . The inverse Mills' ratio can be calculated as $\lambda = \frac{\phi(h(z_i, \alpha'))}{\Phi(z_i \alpha')}$.

where, $\phi(\cdot)$ is the normal probability density function and Φ is the cumulative distribution function. Equation (4) is estimated using OLS, conditional on ($y_i = 1$). Including λ (the inverse mills' ratio) ensures consistent parameter estimates by correcting for the non-random selection into market participation (Greene, 2003).

3.11.2 Multinomial Logit (MNL) Model

The Multinomial Logit (MNL) model was employed to examine the factors influencing smallholder farmers' choice of rice marketing channels, including farmgate buyers, middlemen, cooperatives, and urban markets. This model is suitable when the dependent variable is categorical and consists of more than two unordered alternatives.

Since farmers in the study area had access to multiple mutually exclusive marketing options, the MNL model was appropriate for estimating the likelihood of selecting each channel relative to a reference category. This approach enables the analysis of how various socio-economic, institutional, and market-related factors affect channel choice. The use of the MNL model in this context is consistent with its application in agricultural marketing literature (Gujarati & Porter, 2009).

Following Greene (2003), the probability that the i^{th} farmer chooses the j^{th} of 3 channels is denoted by P_{ij} . The Multinomial Logit (MNL) model expresses this probability as:

$$P_{ij} = \frac{\exp(\beta_j x_i)}{1 + \sum_{j=1}^3 \exp(\beta_j x_i)} \quad \text{for } j = 1, 2, 3 \quad (3.8)$$

where x_i is a vector of contextual socio-economic characteristics of the i^{th} farmer, β_j is a vector of parameters associated with the j^{th} alternative, and the denominator is the sum of exponentiated utilities across the three marketing channel alternatives.

The coefficients for the base (reference) category are normalized to zero. The probability of choosing the base category (say, $j = 1$) is:

$$P_i(j = 1 | x_i) = \frac{1}{1 + \sum_{j=1}^3 \exp(\beta_j x_i)} \quad (3.9)$$

The probabilities of selecting the remaining alternatives ($j = 2$ or 3) are:

$$P_i(j = m | x_i) = \frac{\exp(\beta_j x_i)}{1 + \sum_{j=2}^3 \exp(\beta_j x_i)} \quad \text{for } m > 1 \quad (3.10)$$

To understand how individual explanatory variables influence the likelihood of choosing a given marketing channel, marginal effects are computed by differentiating equation (3.7) concerning the covariates:

$$\frac{\partial P_j}{\partial X_i} = P_j[\beta_j - \sum_{j=0}^3 P_j \beta_j] = P_j[\beta_j - \bar{\beta}] \quad (3.11)$$

where P_j is the probability of the farmer choosing the market channel j , and β_j is a vector of regression parameter estimates associated with the alternative j (Greene, 2003). The primary assumption underlying the MNL model is the independence of irrelevant alternatives (IIA), which implies that the relative odds of choosing between any two alternatives are unaffected by the presence or characteristics of other alternatives. Importantly, MNL does not require the explanatory variables to follow a multivariate normal distribution. Thus, it accommodates continuous, binary, and ordinal predictors (Aldrich & Nelson, 1984). Compared to the Multinomial Probit model, the MNL is less computationally intensive, and its results are easier to interpret.

3.11.3 Multinomial Endogenous Switching Regression (MESR) Model

The Multinomial Endogenous Switching Regression (MESR) model is employed in this study to estimate the impact of smallholder rice farmers' marketing channel choices on household welfare outcomes, specifically net farm income and food security. This model addresses potential selection bias due to farmers self-selecting into specific marketing channels based on both observed and unobserved characteristics.

The Multinomial Endogenous Switching Regression (MESR) model is employed in this study to estimate the impact of smallholder rice farmers' marketing channel choice on household welfare, specifically income and food security. In the MESR model, an Ordinary Least Squares (OLS) regression with selectivity correction was estimated to examine the relationship between the

and λ_{pi} is the Inverse Mills Ratio (IMR) computed from the first-stage selection model; σ_p represents the covariance between the selection error term (ε_{pi}) and the outcome error term (φ_{pi}), which is assumed to have an expected value of zero.

The IMR term, λ_{ai} used to correct for selection bias, is calculated as follows:

$$\lambda_{ai} = \sum_{p \neq a}^a \rho_a \left[\frac{\rho_{ip} \ln(\hat{P}_{ip})}{1 - \hat{P}_{ip}} + \ln(\hat{P}_{ai}) \right] \quad (3.14)$$

where ρ is the correlation between the selection and outcome error terms, and \hat{P} represents the estimated probability of choosing a particular channel.

To address potential heteroscedasticity in the IMR terms, bootstrap standard errors are applied. For consistent estimation of the outcome parameters β_p , following Teklewold et al., (2013), the model includes selection instruments in the first-stage choice equation (Eq. 3.14). In addition to the non-linearity of the model, three instrumental variables are used: (i) contact with extension agents, (ii) membership in a farmer-based organization, and (iii) distance to market.

These instruments are assumed to influence the choice of marketing channel but not the outcome variables directly. Their validity is confirmed through a falsification test, as recommended by Shiferaw et al., (2014) and Di Falco and Veronesi (2013), which stipulates that a valid instrument should affect the selection equation without directly influencing the outcome variable.

3.11.3.1 Estimation of the Average Treatment Effects (ATT)

The Multinomial Endogenous Switching Regression (MESR) model was employed to estimate the Average Treatment Effect on the Treated (ATT) by comparing the expected welfare outcomes (net farm income and food security) of rice market participants and non-participants under actual and counterfactual scenarios. The ATT measures the change in the outcome variable attributable to the selling to millers/processors, following the approach of Khonje et al., (2015). The conditional expectations are specified as:

- Actual outcome for participants (regime p):

$$E(A_{pi} | U = p, \alpha_{pi}, \theta_{pi}, \lambda_{ait}) = \beta_p \alpha_{ji} + \partial_p \theta_{pi} + \sigma_p \lambda_{ait} \quad (3.15a)$$

- Counterfactual outcome for participants had they not participated (regime 1):

$$E(A_{1it}|U = p, \alpha_{pi}, \theta_{pi}, \lambda_{ait}) = \beta_1 \alpha_{ji} + \partial_1 \theta_{pi} + \sigma_1 \lambda_{ait} \quad (3.15b)$$

Equation (9b) represents the expected welfare outcome for participants if they had not participated, assuming their characteristics remained unchanged, but the outcome equation followed the non-participants' parameters (Kassie et al., 2018). These values are predicted using the MESR estimates (Eq. 8), and the ATT is calculated as the difference between Equations (9a) and (9b) (Kassie et al., 2015):

$$ATT = E(A_{pi}|U = p) - E(A_{1it}|U = p) = \alpha_{pi}(\beta_P - \beta_1) + \theta_{pi}(\beta_P - \beta_1) + \lambda_{ait}(\sigma_P - \sigma_1) \quad (3.16)$$

The first term (α_{pi}) The right-hand side of Eq. (10) reflects differences in outcomes due to observable characteristics. The second term (θ_{pi}) and third terms (λ_{ait}), derived using the Mundlak correction, account for selection bias and unobserved heterogeneity.

Table 3.1 Econometric Models Summary

Research Question	Method	Why It is Suitable
What determines participation?	Double Hurdle	Separate decision to participate and the amount sold
What determines channel choice?	Multinomial Logit	Models' multiple discrete choices
Does participation affect welfare?	Multinomial Endogenous Switching Regression	Corrects for self-selection bias in impact estimation

3.12 Welfare Measurement

In rural Nigeria, smallholder farming households engage with a range of agricultural marketing channels—including millers/processors, wholesalers, and brokers—that are closely linked to household welfare outcomes. Although welfare is a multidimensional construct, this study employs two key indicators to assess household welfare: net farm income and food security. Each is detailed below.

3.12.1 Net Farm Income (NFI) in the Context of Marketing

Net Farm Income (NFI) represents the net returns accruing to farmers from rice marketing activities, incorporating both revenues generated and costs incurred during the marketing process.

For this study, NFI is defined as the difference between total revenue (TR) from rice sales and total marketing-related costs (TC) over the 12 months preceding the survey.

Total revenue is calculated as the quantity of rice sold multiplied by the prevailing market unit price, actual prices for sellers, and average market prices for non-sellers. Total cost (TC) includes fixed and variable expenses, with particular attention to transaction costs associated with marketing. These include transportation expenses, market access costs (e.g., distance-related costs or travel time), and communication costs involved in identifying buyers, negotiating prices, and arranging logistics. These transaction costs are largely variable and scale with output volume and market proximity. Thus, the NFI captures the economic efficiency of farmers' marketing decisions. The model follows the standard expression:

$NFI = TR - TC$, where $TC = TFC + TVC$, and TVC includes transaction-related expenditures.

By incorporating marketing-specific transaction costs, this approach provides a more accurate estimation of profitability from market engagement. This aligns with methodologies adopted in previous studies such as Khonje et al., (2015) and Kassie et al., (2011).

3.12.2 Food Security

Food security was assessed using the Household Food Insecurity Access Scale (HFIAS), a validated tool developed by the Food and Nutrition Technical Assistance Project (Coates et al., 2007). The HFIAS captures access-related dimensions of food insecurity, which are particularly relevant in rural, climate-vulnerable settings. The tool consists of nine standardized questions addressing food-related anxiety, dietary quality, and insufficiency of food over the past 30 days. Responses are scored on a 4-point frequency scale (0 = never to 3 = often) and aggregated to form a composite score. Higher scores reflect greater food insecurity.

This tool is widely used in rural African contexts and is appropriate for evaluating food access vulnerability in subsistence-oriented households (Coates et al., 2007; Swindale & Bilinsky, 2006). A summary of the HFIAS instrument is provided in Appendix A2.

3.13 Limitations of the Study

Despite rigorous methodological procedures, this study has several limitations. First, it relies on self-reported data, such as income, sales, expenditures, and food consumption, which are vulnerable to recall bias, potentially affecting the accuracy of welfare and marketing behaviour estimates. Second, while structured questionnaires ensured consistency, they may have restricted the depth of responses, particularly on complex marketing decisions and household dynamics. As a result, some contextual nuances may have been overlooked.

Third, the cross-sectional design limits causal inference. Although models like the Double Hurdle and Endogenous Switching Regression addressed selection bias and treatment effects, the absence of longitudinal data means the study cannot fully capture time-dependent factors or long-term welfare outcomes. Fourth, seasonal variations in prices, income, and food availability were not captured since data collection occurred during a single period (February–March 2025). This limits the ability to generalize findings across different agricultural cycles.

Finally, logistical and financial constraints confined the geographic scope, potentially reducing the external validity of the results. Although efforts were made to ensure representativeness, the findings may not fully apply to all rice-producing areas in Nigeria, especially those with different agro-ecological or market conditions. Despite these limitations, the study offers important insights into the factors influencing market participation, marketing channel choices, and their effects on smallholder farmer welfare.

3.14 Conclusion

This chapter outlined the methodological approach employed to investigate the determinants of market participation and marketing channel choice among smallholder rice farmers, as well as the impact of participation on household welfare. It detailed the study area, sampling procedure, data collection instruments, ethical considerations, and the econometric techniques used for analysis. By integrating descriptive and econometric methods, the study provides a robust framework for answering the research questions. The next chapter presents and discusses the empirical findings derived from this methodology.

CHAPTER 4: RESULTS & DISCUSSIONS

Introduction

This chapter presents the results of the data analysis, structured around the study's key objectives. It begins with descriptive statistics to profile respondents and summarize key variables, followed by econometric results examining the factors influencing market participation, marketing channel selection, and the welfare effects of participation. These findings are interpreted in light of existing literature to provide context and deeper insight into the dynamics of smallholder rice marketing in Nigeria.

4.1 Description and Summary Statistics of Econometric Variables by Market Participation Status

Table 4.1 summarizes descriptive statistics for the variables used in the econometric analysis, disaggregated by market participation status. Among the 200 rice farming households surveyed, 83% participated in rice markets, selling an average of 952.93 kilograms per hectare. Millers were the most used marketing channel (64%), followed by wholesalers (26%) and brokers (10%), indicating that millers play a central role in rice commercialization, likely due to their demand for bulk purchases or existing procurement arrangements.

Market participants generally exhibit characteristics more conducive to commercialization. They tend to have higher educational attainment and better access to extension services, formal credit, communication tools, and storage facilities, all statistically significant. These factors reflect the importance of human capital and institutional support in facilitating market engagement. Additionally, participants reported greater satisfaction with rice prices received, suggesting more favourable market outcomes.

Differences are also evident in gender, farming experience, and group membership. Participants are more likely to be male, have longer experience in rice farming, and belong to farmer associations. While household size and distance to markets show no significant differences, participants tend to operate slightly larger rice farms and achieve higher yields. These patterns highlight the role of production capacity, access to services, and social capital in influencing smallholders' ability to participate in and benefit from output markets.

Table 4.1: Description and summary statistics of the variables used in the econometric analysis

Variables	Description and measurement	Full sample (n=200)	Participants (n=166)	Non-participants (n=52)	t-test
<i>Dependent variable:</i>					
Market participation	If farmer participated in rice market (Yes = 1; No = 0)		0.83	0.26	
Market participation intensity	The quantity of rice offer sale (in kg/ha)		952.93		
Wholesalers	If farmer sell rice to wholesalers (Yes = 1; No = 0)		0.26		
Brokers	If farmer sell to brokers or commission (Yes = 1; No = 0)		0.10		
Millers	If farmer participated in rice market (Yes = 1; No = 0)		0.64		
<i>Explanatory variables:</i>					
Age	Age of farmer (years)	48.22	48.38	48.09	0.27
Gender	Gender of the farmer – (Male = 1; Female = 0)	0.58	0.65	0.52	2.13 ^b
Educational attainment	Years of formal schooling	5.35	6.61	3.61	4.27 ^a
Household size	Number of people in the household	6.41	6.43	6.30	0.07
Farm size	Area of land devoted to rice cultivation (hectares)	2.23	2.26	2.17	1.37 ^a
Non-farm employment	If farmer has off-farm employment – (Yes = 1; No = 0)	0.67	0.73	0.46	0.27 ^a
Farming experience	Years of experience in rice farming	15.28	16.07	14.71	2.02 ^b
Group membership	Membership in farmer's-based groups – (Yes = 1; No = 0)	0.67	0.72	0.61	1.78 ^c
Extension access	If farmer received extension advice – (Yes = 1; No = 0)	0.28	0.49	0.11	3.77 ^a
Formal credit access	Access to formal credit sources – (Yes = 1; No = 0)	0.36	0.55	0.22	5.59 ^a
Market distance	Distance to the nearest local market (in kilometers)	4.30	9.8	10.31	0.30
Transportation	Number of transport-related assets owned (e.g., bike, truck)	2.64	2.50	2.40	2.02 ^b
Communication	If farmer own means of communication. – (Yes = 1; No = 0)	0.75	0.98	0.44	11.00 ^a
Storage	If farmer own storage facility – (Yes = 1; No = 0)	0.76	0.99	0.57	8.73 ^a
Price satisfaction	Perceived satisfaction with price received for rice (Likert scale)	0.28	0.49	0.11	3.77 ^a
Rice output (yield)	The quantity of rice output from the farm (kg/ha)	865.65	1084.21	693.93	8.412

Note: ^{a, b, c} denotes statistical significance at 1%, 5% and 10% respectively. Source: Calculated from 2025 field survey data.

4.2 Results of the Double Hurdle Model for Determinants of Rice Market Participation and Quantity Sold.

This section presents the results of the Double Hurdle model analysis examining the determinants of smallholder rice farmers' marketing participation decisions and the determinants of the intensity of participation.

4.2.1 Specification Test

Prior to estimating the Double Hurdle model, diagnostic checks were conducted. Variance Inflation Factor (VIF) values were below the critical threshold of 10, and correlation coefficients were under 0.5, indicating no multicollinearity issues (Gujarati & Porter, 2009). Heteroscedasticity-robust standard errors were used to address potential heteroscedasticity typical of cross-sectional data (White, 1980). The model correctly predicts 86% of market participation outcomes. The Wald test rejects the null hypothesis that all coefficients are jointly zero ($p < 0.01$), confirming the explanatory power of the model.

In the second-stage estimation (Hurdle 2), coefficients are interpreted as elasticities due to the double-log specification. The Inverse Mills Ratio (λ) is highly significant ($p < 0.001$), indicating selection bias would have occurred if the participation decision were ignored. This justifies the joint estimation of participation and quantity sold.

4.2.2 Determinants of Market Participation and Quantity of Rice Sold

The results of the Double Hurdle model, jointly estimating the probit selection equation for rice market participation and the truncated regression for the quantity of rice sold, are presented in Table 4.2. The probit estimates identify factors influencing the likelihood of market participation, while the second hurdle estimates the determinants of the quantity sold among participating households. To enhance interpretation, both coefficient estimates and marginal effects—reflecting the change in the probability of participation associated with each explanatory variable—are reported.

Table 4.2: Estimates of the determinants of rice market participation and quantity sold.

Double Hurdle Regression Estimates				
	Hurdle 1: Probability of participation (Probit regression)	of Hurdle 2: Quantity sold (OLS regression with the IMR)		
Variable	Coefficient	Marginal effects	Coefficient	<i>t</i> -statistics
Age	-0.043 ^b (0.021)	-0.005	-0.005 ^b (0.002)	-2.50
Gender	0.220 ^b (0.110)	0.021	0.215 ^b (0.112)	1.92
Educational attainment	0.023 ^a (0.007)	0.018	0.168 ^a (0.080)	-2.10
Household size	0.060 ^a (0.019)	0.015	0.042 ^b (0.009)	4.66
Farm size	0.266 ^b (0.090)	0.012	-0.066 ^a (-0.013)	5.07
Non-farm employment	-0.056 (0.070)	-0.008	-0.774 ^b (0.38)	-2.03
Farming experience	0.374 (0.736)	0.072	0.534 ^b (0.161)	3.32
Group membership	0.409 (0.312)	0.072	0.692 ^b (0.252)	2.74
Extension access	0.344 (0.438)	-0.106	0.810 ^b (0.401)	2.01
Formal credit access	0.705 ^b (0.361)	0.032	0.292 (0.805)	0.36
Market distance	-0.085 (0.042)	-0.016	0.321 ^b 0.128	2.51
Transportation	0.639 0.429	0.067	0.458 ^b (0.202)	2.27
Communication	0.165 (0.190)	0.058	0.385 ^a (2.63)	0.17
Storage facilities	0.534 ^b (0.161)	0.042	0.409 ^b (0.471)	0.87
Price satisfaction	0.396 ^a (0.133)	0.161	0.390 ^a (0.090)	4.33
IMR (λ)	-	-	1.490 ^a (0.480)	3.10
Constant	-4.318 ^c (2.239)		46.355 ^b (8.813)	5.25
No of Observation		200		
LR Chi ²		146.05		
Pseudo R ²		0.5967		
Log likelihood		-259.24		
Prob>Chi ²		0.0000		
Outcomes correctly predicted		86.7%		

Note: Robust standard errors are in parentheses. ^a, ^b and ^c denote variables are statistically significant at the 1%, 5% and 10% probability levels respectively.

The results in Table 4.3 indicate that age has a statistically significant negative effect on both the likelihood of participating in rice markets and the quantity of rice sold. The marginal effect shows that each additional year of age reduces the probability of market participation by 0.5%. This suggests that older farmers are less inclined to engage in commercial rice transactions and, when they do, tend to sell smaller quantities. This may reflect age-related physical constraints, reduced risk tolerance, or a stronger focus on subsistence farming. Additionally, older farmers may rely more on alternative income sources, lowering their motivation to participate actively in output markets. This finding is consistent with those of Chikhawo et al., (2021).

In contrast, gender significantly affects market participation and the volume of rice sold, with male farmers being more likely to participate and sell larger quantities. The marginal effect shows a 2% higher probability of market participation for male farmers compared to females. This disparity largely results from socio-cultural and institutional barriers that limit women's access to essential productive resources, mobility, and timely market information. Men generally have better access to land, labor, transportation, and financial capital, which strengthens their ability to engage in commercial rice production and marketing. Consequently, male farmers can more effectively capitalize on market opportunities, while female farmers face structural constraints that reduce their market engagement and sales volume. These findings align with previous research by Andaregie et al. (2021) and Belete et al. (2023), emphasizing the critical role of gender dynamics in agricultural commercialization.

Education level has a positive and statistically significant effect on both the likelihood of market participation and the intensity of engagement. The marginal effect suggests that each additional year of education increases the probability of market participation by 1.8%. Educated farmers are better positioned to access, interpret, and utilize market information, allowing them to make informed decisions regarding pricing, timing of sales, and negotiation strategies. This capacity not only facilitates more profitable market engagement but also reduces transaction costs and supports deeper commercialization (Adeoye and Adegbite, 2018; Dlamini and Huang, 2019).

Household size also exhibits a significant positive effect on both market participation and intensity. The marginal effects indicate that farmers from larger households are approximately 1.5% more likely to engage in rice markets. Larger households typically possess greater labour resources, which can be allocated to various stages of rice production and post-harvest activities. This finding

agrees with those of Mkuna and Wale (2022), and Belete and Nigatu, (2023). Labour advantage enhances overall productivity, enabling the production of surplus quantities that can be directed toward market sales.

Farm size exhibits a significant positive effect on both the likelihood and intensity of rice market participation. Marginal effects suggest that farmers with larger landholdings are 1.2% more likely to participate in the market. Greater farm size facilitates production beyond subsistence requirements, thereby generating surplus output for commercialization. This relationship underscores the supply-driven nature of market engagement, as increased production capacity directly contributes to greater market involvement. These findings are consistent with those of Chikhawo et al., (2021) and Haile et al., (2022), who observed that access to larger landholdings significantly enhances smallholder farmers' participation in agricultural markets.

Non-farm employment does not have a significant effect on the decision to participate in rice markets but is negatively associated with the quantity sold. While off-farm income may enhance household financial stability, it can divert labour and time from rice farming, thereby reducing production and marketable surplus. Additionally, the reduced economic pressure from non-farm income may shift household priorities toward subsistence rather than commercialization. This finding supports the view that income diversification can stabilize livelihoods but may limit deeper market engagement (Mbitsemunda & Karangwa, 2017). However, it contrasts with Mmbando et al., (2016), who found that off-farm income can enhance production and market participation.

Membership in farmer associations significantly enhances the level of commercialization among smallholder farmers, though it may not directly influence the initial decision to enter markets. While group affiliation may not prompt market entry, it facilitates greater engagement by reducing transaction costs, improving access to buyers, and strengthening farmers' bargaining power. Through mechanisms such as collective marketing, shared resources, and improved information flow, associations enable members to commercialize a larger share of their output. This finding aligns with recent evidence from Ethiopia, where cooperative membership has been shown to significantly increase commercialization levels among smallholders (Gemechu et al., 2024).

In contrast, access to credit has a statistically significant effect on the decision to participate in rice markets, but not on the volume sold. Marginal effects indicate that farmers with credit access are 3.2% more likely to engage in market transactions. This suggests that financial liquidity helps

farmers overcome entry barriers such as transportation and packaging costs. However, access to credit does not necessarily translate into higher commercialization, possibly due to limited loan sizes, inefficient use of funds, or ongoing production constraints that limit surplus generation. These findings are consistent with Dlamini and Huang (2019), and Hegena and Teshome (2022), who emphasize that while credit is essential for facilitating farm operations, its impact on market intensity depends on how effectively it is used to boost production.

Extension services, on the other hand, were found to significantly influence only the intensity of participation, but not the initial decision to enter the market. This suggests that while extension support may not drive farmers to begin selling, it plays a vital role in enhancing the efficiency and scale of market engagement for those already participating. By improving knowledge of agronomic practices, quality requirements, and post-harvest handling, extension services help farmers boost productivity and market larger quantities (Endalew et al., 2020). These findings align with those of Asfaw et al., (2022) and Hegena and Teshome (2022).

Transaction cost variables—specifically market distance, transportation, and communication—significantly influence the quantity of rice sold but do not affect the initial decision to participate in the market. Greater distances to market are associated with lower volumes sold, whereas ownership of transportation and communication assets corresponds to higher sales volumes. These findings suggest that these factors do not influence market entry but constrain marketing intensity (Beyene et al., 2020; Belete and Nigatu 2023). Improved logistics ease delivery and coordination, enhancing sales, though they are insufficient alone to convert non-participants into market actors. Thus, while market information influences participation, transaction costs shape the extent of engagement.

The analysis reveals that access to storage facilities significantly influences both the decision to participate in rice markets and the intensity of participation. Marginal effects indicate that farmers who have access to storage facilities are 4.2% more likely to engage in market transactions. Access to storage enables farmers to preserve their produce post-harvest, thereby reducing post-harvest losses and allowing them to time their sales for better market prices. This flexibility increases both the likelihood of market entry, and the volume sold. The ability to store rice enhances farmers' bargaining power and mitigates the pressure to sell immediately after harvest when prices are typically low.

Perceived satisfaction with output prices has a statistically significant and positive effect on both the likelihood of market participation and the level of commercialization. Marginal effects indicate that farmers who are more satisfied with rice prices are 16% more likely to engage in market transactions. This suggests that favourable price perceptions—whether based on expectations or past experiences—motivate farmers to participate more actively and sell a greater proportion of their output. These findings align with Abate et al., (2022) and Habtewold et al., (2017), who found that satisfaction with market prices encourages market-oriented production behaviour.

Collectively, these findings highlight the critical role of farmers' demographic characteristics, institutional factors, and transaction cost variables in promoting smallholder market integration. Policies that strengthen these determinants are likely to enhance both the breadth and depth of market participation among rice producers.

4.3 Results of the Multinomial Logit Model for Determinants of Market Channel Choice

This section presents the results of the Multinomial Logit (MNL) analysis examining the determinants of smallholder rice farmers' marketing channel choices. The dependent variable comprises three mutually exclusive options: sales to wholesalers, brokers, and millers, with millers serving as the base category. The model estimates the relative probability of selecting wholesalers or brokers over millers based on a range of explanatory variables, including farmer demographics, farm characteristics, institutional access, and market-related factors.

4.3.1 Specification Tests

The goodness-of-fit of the Multinomial Logit (MNL) model was assessed using the chi-square (χ^2) statistic, which tests the null hypothesis that all coefficients are jointly equal to zero. The model returned a p-value of 0.000, indicating statistical significance at the 1% level. This result confirms that the explanatory variables, taken together, significantly influence the choice of marketing channels among smallholder rice farmers.

In the MNL model, each coefficient represents the change in the log-odds of selecting a particular marketing channel relative to the base category—sales to millers—associated with a one-unit increase in the corresponding independent variable, holding other variables constant (Gujarati, 2007). A positive coefficient suggests an increased likelihood of choosing that channel over the reference group, while a negative coefficient indicates a reduced likelihood. The statistical

significance of each coefficient is determined by its p-value, and standard errors reflect the reliability of the estimates. Table 4.3 presents the MNL results for the determinants of rice marketing channel choice among smallholder farmers. The dependent variable is the selected marketing channel—wholesalers, brokers, or millers (base category). The coefficients show the direction of influence, and marginal effects capture the magnitude of change in probabilities.

Table 4.3: MNL Estimation Results for Determinants of Rice Marketing Channel Choice

Variables	ln(P2/P1) Wholesalers' vs Millers' Contrast			ln(P3/P1) Brokers vs Millers Contrast		
	Coefficient	<i>p</i> value	<i>Marginal effects</i>	Coefficient	<i>p</i> value	<i>Marginal effects</i>
Age	-0.012 (0.006)	0.045 ^b	-0.013	-0.018 (0.007)	0.010 ^b	-0.012
Gender	0.520 (0.200)	0.009 ^a	0.078	0.130 (0.210)	0.540	0.019
Educational attainment	0.140 (0.060)	0.020 ^b	0.035	0.070 (0.065)	0.280	0.010
Household size	0.030 (0.050)	0.550	0.006	0.020 (-0.052)	0.680	0.004
Farm size	0.220 (0.080)	0.006 ^a	0.061	0.180 (0.090)	0.045 ^b	0.049
Non-farm employment	0.188 (1.272)	0.882	-0.003	-0.120 (0.170)	0.480	-0.019
Farming experience	-0.236 (0.721)	0.744	0.008	0.009 (0.013)	0.490	0.003
Group membership	-0.274 (0.334)	0.412	0.051	-0.427 (1.293)	0.741	0.042
Extension access	0.150 (0.130)	0.260	0.019	0.360 (0.140)	0.010 ^a	0.056
Formal credit access	0.430 (0.150)	0.004 ^a	0.067	-0.200 (0.094)	0.033 ^b	-0.031
Market distance	-0.070 (0.030)	0.022 ^b	-0.018	-0.040 (0.032)	0.210	-0.010
Transportation	0.110 (0.050)	0.028 ^b	0.027	0.070 (0.052)	0.180	0.015
Communication	0.300 (0.140)	0.032 ^b	0.046	0.420 (0.150)	0.005 ^a	0.064
Storage facilities	0.190 (0.110)	0.082 ^c	0.029	0.240 (0.120)	0.047 ^b	0.038
Price satisfaction	0.510 (0.200)	0.011 ^b	0.094	0.610 (0.210)	0.004 ^a	0.080

No of observations = 200
-2loglikelihood = 171.69 McFadden R²=0.506 Nagelkerke R² of 0.713
 $\chi^2 = 175.79$ Likelihood ratio test $\chi^2 = 246.18$ *df*=30; *p* =0.000
Classification accuracy (correctly predicted):
Millers = 85.20%; Wholesalers = 68.00%; Brokers = 60.00%; Overall Model = 75.00%

Note: Base category is Millers (P_1). P_2 and P_3 represent the probability that a farmer selects Wholesaler and Brokers channels, respectively. Standard errors are in parentheses. ^a, ^b and ^c denote variables are statistically significant at the 1%, 5% and 10% probability levels respectively.

Age exhibits a small but statistically significant influence on marketing channel choice. Specifically, it has a positive marginal effect of 0.013 on the likelihood of choosing wholesalers over millers, indicating that older farmers are 1.3% more likely to transact with wholesalers. This may reflect long-standing trading relationships or a preference for less physically demanding transactions. Conversely, age has a negative and statistically significant marginal effect of -0.012 on the choice of brokers over millers, suggesting that older farmers are 1.2% less likely to engage with brokers—possibly due to a desire to avoid the perceived risks or uncertainties associated with broker-mediated sales. These findings align with Tewoderos et al., (2020) and Donkor et al., (2023), who reported that farmers' age significantly influences marketing channel selection.

Gender significantly influences marketing channel selection among smallholder rice farmers, with male farmers being 2.6% more likely to sell to wholesalers rather than millers. This disparity is driven by several interrelated factors. Male farmers generally have greater mobility, broader access to market information, and stronger social networks, which enable them to engage more effectively with wholesalers in centralized markets. Conversely, female farmers often face mobility restrictions, greater time burdens due to domestic responsibilities, and limited access to critical resources such as capital and extension services. These constraints restrict their participation in more distant or competitive marketing channels, leading them to focus on localized, small-scale trading. This gender gap in market participation not only affects income opportunities for female farmers but also highlights the need for targeted policies and interventions. Supporting female farmers through improved access to productive resources, tailored extension services, and reduction of socio-cultural barriers is essential to foster inclusive market engagement and promote equitable economic empowerment. These findings are consistent with existing studies (Gebre et al., 2020; Legesse et al., 2024) that document similar gender-based disparities in agricultural marketing.

Educational attainment is positively associated with the likelihood of selecting brokers over millers, with a marginal effect of 0.019. This indicates that better-educated farmers are 1.9% more likely to opt for alternative marketing channels beyond the dominant millers. This tendency may

be attributed to their enhanced access to market information, stronger negotiation skills, and greater responsiveness to price differentials or marketing opportunities that brokers may offer. Education enhances farmers' decision-making capacity, enabling them to evaluate marketing margins, transaction costs, and channel-specific benefits more effectively. These findings are consistent with Legesse et al., (2024) and Tewoderos et al., (2020), who found that educational level significantly influences farmers' market engagement and choice of marketing outlets by improving their ability to process information and assess market dynamics.

Farm size has a statistically significant effect on marketing channel choice. Specifically, it positively influences the likelihood of selecting wholesalers over millers, with a marginal effect of 0.054, and negatively affects the likelihood of selecting brokers over millers, with a marginal effect of -0.049 . This means that a one-unit increase in farm size increases the probability of choosing wholesalers over millers by 5.4% and decreases the probability of choosing brokers over millers by 4.9%. These results suggest that larger-scale producers are more inclined to engage with channels capable of handling greater volumes. Millers and wholesalers—who typically purchase in bulk—are therefore more attractive to farmers with larger marketable surpluses. This finding highlights the importance of farm size in shaping marketing channel preferences, particularly in systems where economies of scale and volume-driven transactions are key. These insights align with earlier studies by Degaga and Alamarie (2020) and Legesse et al., (2024), which also identified farm size as a significant determinant of channel choice.

Access to formal credit exerts a strong and statistically significant influence on marketing channel choice. Specifically, farmers with access to credit are 6.7% more likely to sell to wholesalers and 3.1% less likely to sell to brokers, relative to millers. This suggests that credit access enhances farmers' ability to engage with more capital-intensive or structured marketing arrangements. By improving liquidity, formal credit enables farmers to cover essential marketing costs, such as transportation, packaging, or storage, thereby expanding their options and bargaining power in choosing sales channels (Barrett et al., 2017; Osabohien et al., 2020). The reduced likelihood of selling to brokers may reflect a strategic shift away from informal or intermediary-driven channels, which often offer lower prices or less favourable terms. These findings align with existing literature emphasizing the role of credit in strengthening farmers' market participation and decision-making flexibility (Mmbando et al., 2016; Ibikoule et al., 2024).

Access to extension services significantly increases the likelihood of choosing wholesalers over millers, with a marginal effect of 0.054, indicating that farmers with extension access are 5.4% more likely to sell to wholesalers. This suggests that advisory services enhance farmers' awareness of market options and build confidence in engaging with more competitive channels. Recent studies confirm that extension access positively influences market participation by improving farmers' decision-making and access to market information (Endris et al., 2020; Asfaw et al., 2022).

Market distance has a negative and statistically significant effect on the likelihood of selling through wholesalers relative to millers. A marginal effect of -0.018 indicates that for each unit increase in distance to market, farmers are 1.8% less likely to sell to wholesalers compared to millers. This suggests that millers, often locally embedded within rural procurement systems, remain more accessible for farmers in remote areas. In contrast, ownership of transport assets positively influences the likelihood of using wholesalers, with a marginal effect of 0.027—implying that farmers with more transport means are 2.7% more likely to sell to wholesalers than to millers. These results highlight how physical proximity and mobility constraints shape channel choice, with transport access mitigating the disadvantages of distance (Ibikoule et al., 2024; Mdoda et al., 2024).

Ownership of communication assets and storage facilities significantly increases the likelihood of smallholder farmers selling through wholesalers and brokers compared to millers. Specifically, communication assets raise the probability of selling through brokers by 6.4%, while storage facilities increase the likelihood of selling to brokers over millers by 3.8%. These assets enhance farmers' ability to coordinate sales, monitor prices, and store produce, thereby reducing transaction costs and providing greater flexibility in timing and negotiating sales. This finding is consistent with previous research showing that access to communication tools and storage infrastructure facilitates market participation and shapes farmers' choice of marketing channels (Chiv et al., 2020; Ibikoule et al., 2024).

Perceived price satisfaction significantly influences smallholder farmers' choice of marketing channels. Specifically, farmers who are satisfied with the prices they receive are 9.4% more likely to sell to wholesalers and 8% more likely to engage with brokers over millers. This suggests that favourable price perceptions motivate farmers to diversify their marketing channels in pursuit of

better returns. These findings align with previous research indicating that price expectations and satisfaction are critical determinants of market outlet selection among smallholder farmers (Mmbando et al., 2017; Tian et al., 2025).

4.4 Results of the Multinomial Endogenous Switching Regression on the Impact of Market

This section presents the results of the Multinomial Endogenous Switching Regression (MESR) model, used to assess the impact of smallholder rice farmers' market participation on household welfare, specifically net farm income and food security.

4.4.1 Model Specification Tests

To ensure consistent estimation of outcome parameters and address potential selection bias, three instrumental variables were included: (i) contact with extension agents, (ii) membership in a farmer-based organization, and (iii) distance to market. As noted by Di Falco and Veronesi (2013), valid instruments must influence market channel choice but not directly affect the outcome variable.

In this study, the instruments are jointly significant in the first-stage multinomial selection model ($\chi^2 = 60.04, p = 0.005$), confirming their relevance. To test the exclusion restriction, the instruments were regressed on the outcome variable (net farm income). The results show that they are not jointly significant: non-market participants ($F = 1.53, p = 0.2671$), millers ($F = 1.15, p = 0.3247$), wholesalers ($F = 0.95, p = 0.4207$), and brokers ($F = 0.10, p = 0.9057$). These results support the validity of the instruments, as they influence channel selection but not the outcome directly, satisfying both the relevance and exclusion conditions.

The analysis focuses on the Average Treatment Effect on the Treated (ATT), which compares observed outcomes for market participants under actual conditions with their estimated outcomes under the counterfactual scenario of non-participation. The ATT provides a robust measure of the effectiveness of different marketing channel regimes among smallholder farmers (Rosenbaum, 2002). The MESR-based ATT estimates for each marketing channel are summarized in Table 4.4.

Table 4.4: Average Treatment Effects of Marketing Channel Choices on Household Welfare (MESR Estimates)

Welfare Outcomes	Market channel choice (<i>j</i>)	Participants	Non-participants	ATT (3) = (1) – (2)
		<i>j</i> = (2,3,4) (1)	<i>j</i> = (1) (2)	
<i>Net farm income</i> (₦000/tons)	Millers	158 (12) ^{SE}	106 (21)	52 ^b
	Wholesalers	131 (7)	87 (5)	44 ^c
	Brokers	67 (3)	54 (5)	13 ^a
<i>Food Insecurity</i> (HFIAS Score)	Millers	-0.652 (0.180)	-0.100 (0.029)	-0.552 ^a
	Wholesalers	-0.598 (0.163)	-0.119 (0.02)	-0.479 ^a
	Brokers	-0.410 (0.372)	-0.121 (0.023)	-0.289 ^a

Standard errors are in parenthesis. ^{a, b, and c} denote statistical significance at 1%, 5%, and 10% probability levels, respectively. ₦ is the symbol for Nigerian currency – the Naira.

4.4.1 Net farm income effect

The unconditional average treatment effects indicate that smallholder rice farmers who participate in rice markets through various marketing channels earn, on average, higher net farm incomes than non-participants. This highlights the critical role of market participation in enhancing household income among smallholder farmers.

The Average Treatment Effect on the Treated (ATT) provides more nuanced insights into the income differentials associated with specific marketing channels. Farmers who sold directly to millers earned an average net income of ₦158,000 (approximately \$102) per ton, compared to ₦106,000 (approximately \$68) per ton for observationally similar non-participants. The resulting ATT of ₦52,000 (approximately \$34) is statistically significant, suggesting that the income gain is causally attributable to participation in the miller channel. This income advantage likely stems from quality-based pricing, reduced intermediary costs, and stronger buyer relationships offered by millers, which collectively enhance profitability in this channel.

Similarly, farmers selling to wholesalers earned approximately ₦131,000 (approximately \$85) per ton, whereas their non-participant counterparts earned ₦87,000 (approximately \$56) per ton. This results in a statistically significant ATT of ₦44,000 (approximately \$28). Although slightly higher

in absolute terms than the ATT associated with the miller channel, this figure reflects the intermediary nature of wholesalers, placing their position between brokers and millers with respect to income advantages.

By contrast, farmers who marketed their produce through brokers recorded the smallest income gain. Participants in this channel earned approximately ₦67,000 (approximately \$43) per ton, compared to ₦54,000 (approximately \$35) per ton for similar non-participants. The resulting ATT of ₦13,000 (approximately \$8) remains statistically significant but modest, likely reflecting reduced price transparency, weaker bargaining power, and the higher margins typically extracted by brokers in the marketing chain.

Overall, these findings demonstrate that market channel choice significantly affects household income outcomes. Participation in more organized or direct channels such as those involving millers or wholesalers leads to higher financial returns. This underscores the need for policy interventions that improve smallholders' access to efficient, transparent, and higher-value marketing outlets.

4.4.2 Food Security effect

Participation in organized market channels is associated with a reduction in household food insecurity, as measured by the Household Food Insecurity Access Scale (HFIAS). The findings of this study reveal that engagement in structured marketing channels leads to statistically significant improvements in food security, with Average Treatment Effects on the Treated (ATT) ranging from -0.289 to -0.552 . These results suggest that participation in formalized market arrangements meaningfully enhances food access among smallholder rice farmers, although the magnitude of the effect differs by marketing channel.

Farmers selling directly to millers experienced the greatest reduction in food insecurity, with an ATT of -0.552 . This substantial improvement may be attributed to more favourable conditions in miller transactions, such as consistent demand, higher transaction volumes, and relatively better prices, which collectively enhance household income and food access.

Similarly, participants in the wholesaler channel recorded a food insecurity reduction of -0.598 , compared to -0.119 among comparable non-participants, yielding an ATT of -0.479 . While slightly less impactful than the miller channel, this result still signifies a strong positive effect on

food security, likely reflecting the benefits of engaging with better-capitalized and stable market actors.

Farmers marketing through brokers showed the smallest, yet still significant, reduction in food insecurity, with an ATT of -0.289 . Although broker-mediated sales offer less favourable terms relative to millers and wholesalers—due to potentially lower prices or weaker buyer relationships—they still contribute to food security improvements by providing market access and income diversification.

Overall, the findings highlight that structured market participation and informed marketing channel selection are critical to improving rural household welfare. Access to well-organized and reliable channels—particularly millers—significantly reduces food insecurity and enhances income outcomes. This suggests that marketing decisions are not merely transactional but strategic, with important implications for livelihood resilience and food consumption. Policy interventions that strengthen smallholders' connectivity to high-value channels through improved institutional support, extension services, and market infrastructure could serve as effective tools for promoting both income growth and food security in rural communities.

4.5 Chapter Summary

In Nigeria, the growing urgency to improve market access for farmers is partly driven by the limited opportunities for land expansion, as rapid population growth constrains the availability of cultivable land. This makes market integration a critical pathway for enhancing smallholder welfare through improved productivity and income. This chapter examined the welfare effects of market participation and marketing channel choices among smallholder rice farmers in Oyo State, Nigeria, using the Multinomial Endogenous Switching Regression (MESR) model.

The findings show that participation in rice markets is significantly associated with higher net farm incomes and improved food security outcomes. However, the extent of these benefits varies by marketing channel. Specifically, farmers selling directly to millers achieved the highest income gains and greatest reductions in food insecurity, followed by those engaging with wholesalers and, to a lesser extent, brokers. These differences reflect the varying degrees of market efficiency, transaction costs, and buyer relationships across channels.

Determinants of market participation and channel choice included demographic factors (age, education, gender), farm characteristics (farm size, farming experience), institutional access (extension services, credit, group membership), and transaction cost variables (market distance, transport, communication). Marginal effect analysis revealed that factors like farm size, price satisfaction, and access to communication infrastructure significantly increased both participation likelihood and commercialization intensity.

Furthermore, the MESR approach accounted for selection bias, confirming the robustness of the estimated treatment effects. The use of valid instrumental variables—such as extension access, group membership, and market distance—was justified through specification tests, which supported their relevance in explaining channel selection without directly influencing outcomes.

Overall, the results highlight the critical role of structured and efficient marketing channels in improving smallholder welfare. Policies that strengthen farmer linkages to millers and wholesalers, enhance institutional support, and reduce transaction costs could significantly boost rural incomes and food security.

CHAPTER 5: SUMMARY, CONCLUSION, AND POLICY RECOMMENDATIONS

Introduction

This chapter presents the summary, conclusions, and policy recommendations derived from the study. It is structured into four sections. The first section provides a concise summary of the key findings. The second and third sections outline the main conclusions and offer relevant policy recommendations, respectively. Finally, the fourth section suggests directions for future research.

5.1 Summary of the Study

Rice is a key staple in Nigeria with growing demand driven by population growth and rising incomes. Despite being the largest rice producer in West Africa, Nigeria faces a large supply gap met largely through imports. Marketing inefficiencies and limited market access continue to constrain smallholder farmers, who often resort to distress sales and have limited bargaining power.

This dissertation explored the critical role of marketing channels in shaping the welfare of smallholder rice farmers in Oyo State, southwestern Nigeria. The foundation of the study was laid in Chapter 1, which highlighted the significance of rice as a staple crop, the growing demand-supply gap in Nigeria, and the pressing need to improve market access for smallholder farmers to enhance their livelihoods and food security.

Chapter 2 provided a comprehensive review of relevant theories, concepts, and empirical studies related to agricultural marketing and channel choice. While existing literature offers insights into the determinants of marketing behaviours, notable gaps exist specifically concerning rice farmers in Nigeria. This review identified the need for empirical investigation into the socio-economic, institutional, and market factors influencing farmers' marketing decisions and their welfare impacts.

Chapter 3 outlined the research methodology, describing a multi-stage sampling design that captured a representative sample of 200 smallholder rice farmers. The study employed a mixed-methods approach combining quantitative and qualitative data collection. Advanced econometric models, including the Double Hurdle, Multinomial Logit, and Multinomial Endogenous Switching

Regression were used to analyze determinants of market participation and channel choice, as well as the resulting welfare outcomes measured through net farm income and food security.

Chapter 4 presented the empirical findings. Results indicated that both individual and institutional factors significantly influence smallholder farmers' decisions to participate in markets and the intensity of their commercialization. The choice of marketing channels was influenced by factors such as transaction costs, access to infrastructure, and price incentives. Importantly, participation in more efficient marketing channels was positively associated with increased farm income and improved food security, demonstrating the welfare-enhancing potential of better market integration.

Together, these chapters provide a holistic understanding of how marketing channel selection affects the livelihoods of smallholder rice farmers in Nigeria, filling key gaps in the literature and offering evidence-based insights for policy and development interventions aimed at promoting agricultural commercialization and rural development.

5.2 Summary of Key Finding

This study examines smallholder rice farmers' participation in markets, determinants of marketing channel choice, and the welfare impacts of channel participation in Oyo State. Using a sample of 200 farmers, data were analyzed with Double Hurdle, Multinomial Logit, and Multinomial Endogenous Switching Regression models. Key findings include:

- 83% of farmers participate in rice markets, selling primarily through millers (64%), wholesalers (26%), and brokers (10%).
- Market participation is influenced by demographic factors (age, gender, education), institutional access (credit, extension, storage), and market conditions (price satisfaction, distance).
- Marketing channel choice depends on farmer characteristics, farm size, institutional support, and transaction costs.
- Participation in miller and wholesaler channels leads to significantly higher net incomes and improved food security compared to brokers.

These insights highlight the critical role of efficient marketing channels and institutional support in enhancing smallholder welfare.

5.3 Conclusions

This study confirms that marketing channel participation strongly influences smallholder rice farmers' welfare in Oyo State. Key conclusions are:

- **Market Participation and Channel Use:** Most farmers engage markets, with millers dominating due to bulk purchasing and established buyer relationships. Wholesalers and brokers serve smaller segments with varying impacts on welfare.
- **Determinants of Participation and Choice:** Factors such as education, gender, farm size, credit access, extension services, transport availability, and communication infrastructure shape participation and channel choice. Notably, male farmers are more likely to engage wholesalers, reflecting gender disparities in access to resources and mobility.
- **Welfare Outcomes:** Participation in miller and wholesaler channels significantly increases net farm income and reduces food insecurity, outperforming broker-mediated sales. This demonstrates the value of more direct, efficient, and transparent marketing arrangements.
- **Gender Dimensions:** Gender disparities in market access and outcomes persist. Male farmers benefit from greater resource access, mobility, and market information, while female farmers face constraints limiting their engagement in higher-value channels.

5.4 Policy Recommendations

The study highlights the vital role of market participation and channel choice in shaping the welfare of smallholder rice farmers in Oyo State. Based on empirical findings, the following targeted policy recommendations are proposed:

1. Promote Structured Linkages with Millers and Wholesalers

Strengthen institutional and contractual linkages between smallholder farmers and millers/wholesalers by facilitating out-grower schemes, aggregation centres, and cooperative bulk marketing arrangements. These mechanisms can enhance farmers' access to reliable, high-volume buyers under favourable terms.

2. Reduce Transaction Costs through Rural Infrastructure Investment

Invest strategically in rural roads, transport services, and digital infrastructure, such as mobile network coverage and market information systems, to lower transaction costs and expand access to profitable marketing channels.

3. Enhance Access to Institutional Support Services

Prioritize expanding credit, extension services, and farmer organizations, especially targeting women and remote farmers. Integrating marketing advisory services into extension programs will empower farmers to make informed channel choices based on real-time market information.

4. Support Capacity Building in Market Literacy and Group Marketing

Develop training programs focused on negotiation skills, record-keeping, and price analysis. Strengthen farmer-based organizations to facilitate collective bargaining, coordinated logistics, and quality standardization for bulk sales.

5. Implement Gender-Sensitive Interventions to Address Market Access Gaps

Address gender disparities by reducing women's time burdens via labour-saving technologies, improving their access to transport and market information, and creating safe, decentralized market hubs closer to rural communities.

6. Expand the Role of ICTs in Agricultural Marketing

Encourage public-private partnerships to scale ICT platforms that deliver timely price, buyer, and logistics information, enhancing market transparency and reducing information asymmetries that currently benefit intermediaries.

7. Encourage Storage Infrastructure Development

Support community-level storage solutions through public-private partnerships or cooperative models to reduce post-harvest losses and strengthen farmers' negotiating power by enabling better timing of sales.

8. Introduce Targeted Social Protection to Mitigate Market Risk

Implement price stabilization schemes, weather-indexed insurance, and minimum support price frameworks to protect smallholders, especially those selling through brokers under unfavourable conditions, thus encouraging greater engagement with formal marketing systems.

These recommendations aim to foster a more inclusive, efficient, and welfare-enhancing agricultural marketing system. By addressing both structural barriers and enabling factors, they provide a pathway for transitioning smallholder rice farmers from subsistence-oriented production to more market-integrated and resilient livelihoods.

5.5 Limitations of the Study

Despite rigorous methodology, this study has several limitations:

- Reliance on self-reported data (income, sales, expenditures, food consumption) may introduce recall bias, affecting the accuracy of welfare and marketing behaviour estimates.
- Structured questionnaires, while ensuring consistency, might have constrained the depth of responses on complex marketing decisions and household dynamics, potentially overlooking contextual nuances.
- The cross-sectional design limits causal inference and the ability to capture time-dependent factors or long-term welfare outcomes, despite use of models addressing selection bias.
- Data collection occurred over a single period (February–March 2025), not capturing seasonal price, income, and food availability variations, limiting generalizability across agricultural cycles.
- Geographic scope was limited by logistical and financial constraints, potentially affecting the external validity of findings to other rice-producing regions with different agro-ecological and market contexts.

Nevertheless, the study provides valuable insights into determinants of market participation, channel choice, and their welfare impacts among smallholder rice farmers.

5.6 Recommendations for Future Study

Future research should consider conducting longitudinal studies that follow smallholder farmers over multiple production cycles. This would provide a deeper understanding of how farmers' marketing behaviours evolve in response to changing policies, environmental conditions, and market dynamics. Additionally, comparative studies across different geopolitical zones or agroecological regions in Nigeria would offer insights into how regional disparities in infrastructure, institutional support, and access to information influence marketing channel choices and commercialization outcomes.

Further investigation is needed into the role of digital technologies and e-marketing platforms in shaping market participation. As mobile phones and digital platforms become increasingly integral to agricultural trade, understanding their impact on farmers' access to price information, negotiation power, and customer reach could guide more technology-driven interventions. In the same vein, future studies should explore the influence of gender more thoroughly by disaggregating data to capture the unique constraints and opportunities faced by women in agricultural markets. Such research could better inform gender-sensitive marketing policies and support programs.

Finally, it would be valuable to examine the effectiveness of institutional innovations—such as farmer cooperatives, contract farming, and public-private partnerships—in enhancing farmers' access to profitable markets. Assessing the impact of climate-related risks and environmental shocks on marketing strategies would also be timely, given the increasing variability in agricultural conditions. Moreover, integrating behavioural and psychological perspectives into marketing research could reveal how perceptions of trust, risk, and reward influence channel selection. These directions will deepen the evidence base for designing inclusive and resilient agricultural marketing systems that support smallholder welfare.

Additionally, future research should consider integrating the Dietary Diversity Score (DDS) alongside other food security measures to provide a more comprehensive and robust assessment of smallholder farmers' nutritional outcomes.

REFERENCES

- Abate, D., Mitiku, F., & Negash, R. (2022). Commercialization level and determinants of market participation of smallholder wheat farmers in northern Ethiopia. *African Journal of Science, Technology, Innovation and Development*, 14(2), 428–439.
- Abdul-Rahaman, A. & Abdulai, A. (2020). Farmer groups, collective marketing and smallholder farm performance in rural Ghana. *Journal of Agribusiness in Developing and Emerging Economies*, 10, 511–527.
- Abebe, G. K., Bijman, J., & Royer, A. (2016). Are middlemen facilitators or barriers to improving the welfare of smallholders in rural economies? Empirical evidence from Ethiopia. *Journal of Rural Studies*, 43, 203–213
- Abel, G. J., Barakat, B., KC, S., & Lutz, W. (2016). Meeting the Sustainable Development Goals leads to lower world population growth. *Proceedings of the National Academy of Sciences*, 113(50), 14294–14299.
- Achukwu, G. A., Sennuga, S. O., Bamidele, J., Alabuja, F. O., Bankole, O.-L., & Banabars, T. M. (2023). Factors affecting the rate of adoption of agricultural technology among small-scale rice farmers in Gwagwalada Area Council of FTC, Nigeria. *Journal of Agricultural Science and Practice*, 8(2), 30–37.
- Adanacioglu, H. (2017). Factors affecting farmers' decisions to participate in direct marketing: A case study of cherry growers in the Kemalpaşa District of Izmir, Turkey. *Renewable Agriculture and Food Systems*, 32(4), 291–305.
- Adegbite, O., & Machethe, C. L. (2022). The impact of financial inclusion on the livelihoods of rural smallholder farmers in Nigeria. *African Finance Journal*, 24(2), 38–50.
- Adeoti, A. I., Oluwatayo, I. B., & Soliu, R. O. (2014). Determinants of market participation among maize producers in Oyo State, Nigeria. *Journal of Economics, Management and Trade*, 4(7), 1115–1127.
- Adeoye, I., & Adegbite, O. (2018). Determinants of smallholder plantain farmers' participation in market. *Journal of Innovative Agriculture*, 5, 5–12.
- Addison, M., Ohene-Yankyera, K. & Aidoo, R. (2020). Quantifying the impact of agricultural technology usage on intra-household time allocation: Empirical evidence from rice farmers in Ghana. *Technology in Society*, 63, 101434.
- Adeshina, W. O., Ologbon, O. A. C., & Idowu, A. O. (2020). Analysis of efficiency among rice farmers in Oyo State, Nigeria. *African Journal of Science and Nature*, 6(1), 54–65.

- African Development Bank (AfDB). (2017). *Improving rural road infrastructure for agricultural growth in Africa*. African Development Bank Group. <https://www.afdb.org>.
- Agbola, P. O., Adenaike, T., & Babalola, D. A. (2010). Determinants of farmers' access to output markets and the effects on income: A case study of Ikenne Local Government Area, Nigeria. *Journal of Life and Physical Sciences*, 3(2), 33–39.
- Ahmed, S., & Bagchi, K. (2004). Factors and constraints for adopting new agricultural technology in Assam with special reference to Nalbari district: An empirical study. *Contemporary Indian Policy*, 3, 205–216.
- Amankwah, A. (2023). Climate variability, agricultural technologies adoption, and productivity in rural Nigeria: A plot-level analysis. *Agriculture & Food Security*, 12, Article 7.
- Andaregie, A., Astatkie, T., & Teshome, F. (2021). Determinants of market participation decision by smallholder haricot bean (*Phaseolus vulgaris* L.) farmers in Northwest Ethiopia. *Cogent Food & Agriculture*, 7(1), 1879715.
- Anthony, L., Alabi, O.O., Ebukiba, E.S. & Gamba. V. 2021. Factors influencing output of rice produced and choice of marketing outlets among smallholder farming households, Abuja, Nigeria. *Sarhad Journal of Agriculture*, 37(1): 262-277.
- Antle, J. M. (1987). Econometric estimation of producers' risk attitudes. *American Journal of Agricultural Economics*, 69(3), 509–522.
- Armstrong, G., Kotler, P., Harker, M., & Brennan, R. (2015). *Marketing: An introduction*. Pearson Education.
- Arinloye, D.-D. A., Pascucci, S., Linnemann, A. R., Coulibaly, O. N., Hagelaar, G., & Omta, O. S. (2014). Marketing channel selection by smallholder farmers. *Journal of Food Products Marketing*, 21(4), 337–357.
- Asfaw, D. M., Shifaw, S. M., & Belete, A. A. (2022). Determinants of market participation decision and intensity among date producers in Afar Region, Ethiopia: A double hurdle approach. *International Journal of Fruit Science*, 22(1), 741–758.
- Assefa, A., & Getachew, A. (2023). Determinants of market participation among smallholder teff farmers: Empirical evidence from central Ethiopia. *Environmental Development*, 48, 100929.
- Anteneh, A., Muradian, R., & Ruben, R. (2011). Factors affecting coffee farmers' market outlet choice: The case of Sidama Zone, Ethiopia. Centre for International Development Issues, Radboud University Nijmegen, the Netherlands.

- Awotide, B. A., Karimov, A. A., & Diagne, A. (2016). Agricultural technology adoption, commercialization, and smallholder rice farmers' welfare in rural Nigeria. *Agricultural and Food Economics*, 4(1), 1–24. <https://doi.org/10.1186/s40100-016-0053-5>
- Bailey, D. (2018). Factors influencing market channel access by communal horticulture farmers in Chinamora District, Zimbabwe. *Journal of Development and Agricultural Economics*, 4(6), 147–150.
- Baiyegunhi, L. J. S., & Oppong, B. B. (2016). Commercialisation of mopane worms (*Imbrasia belina*) in rural households in Limpopo Province, South Africa. *Forest Policy and Economics*, 62, 141–148.
- Barrett, C. B., Christiaensen, L., Sheahan, M., & Shimeles, A. (2017). On the structural transformation of rural Africa. *Journal of African Economies*, 26(Supplement_1), i11–i35.
- Barrett, C. B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy*, 33(4), 299–317.
- Bassey, N. E., Akpaeti, A. J., & Udoh, E. J. (2013). Analysis of the structure and performance of rice marketing in Akwa Ibom State, Nigeria. *International Journal of Agriculture and Forestry*, 3(3), 91–97.
- Begho, T., & Begho, M. O. (2023). The occupation of last resort? Determinants of farming choices of small farmers in Nigeria. *International Journal of Rural Management*, 19(2), 298–318.
- Benard, O. A., Job, K. L., Hillary, K. B., & Japheth, K. K. (2015). Determinants of smallholder farmers' extent of market participation: Case of rice marketing in Ahero Irrigation Scheme, Kenya. *Journal of Economics and Sustainable Development*, 6(2), 154–160.
- Bhattacharjee, A. (2012). *Social science research: Principles, methods, and practices* (Book 3). University of South Florida Scholar Commons.
- Boerner, C., & Macher, J. (2001). Transaction cost economics: An assessment of empirical research in the social sciences. Working Paper, Social Science Research Network. <https://doi.org/10.2139/ssrn.281175>.
- Belete, A. A., & Nigatu, A. G. (2023). Determinants of market participation among smallholder teff farmers: Empirical evidence from central Ethiopia. *Environmental Development*, 48, 100929.
- Bellemare, M. F. (2012). As you sow, so shall you reap: The welfare impacts of contract farming. *World Development*, 40(7), 1418–1434.
- Bello, L. O., Baiyegunhi, L. J. S., & Danso-Abbeam, G. (2021). Productivity impact of improved rice varieties' adoption: Case of smallholder rice farmers in Nigeria. *Economics of Innovation and New Technology*, 30(7), 750–766.

- Beyene, T., Mulugeta, W., & Merra, T. (2020). Technical efficiency and impact of improved farm inputs adoption on the yield of haricot bean producer in Hadiya Zone, SNNP Region, Ethiopia. *Cogent Economics & Finance*, 8(1), 1833503.
- Bonanno, A., Russo, C., & Menapace, L. (2018). Market power and bargaining in agrifood markets: A review of emerging topics and tools. *Agribusiness*, 34(1), 6–23.
- Chen, K., Kou, G., & Shang, J. (2014). An analytic decision-making framework to evaluate multiple marketing channels. *Industrial Marketing Management*, 43(8), 1420–1434.
- Chiamjinnawat, B. (2017). *Factors affecting strategic marketing decisions in agriculture: A study of fruit farmers in Thailand* (Doctoral dissertation, Massey University, Palmerston North, New Zealand). Massey University.
- Chikhawo, M., Katengeza, S., Okello, J. J., Phiri, M. A. R., & Chipungu, F. (2024). Analysis of factors influencing market participation among orange-fleshed sweet potato smallholder farmers in southern region of Malawi: A case of RTC project. *Crop Science*, 64, 1442–1451.
- Chiv, R., Nie, F., & Tum, S. (2020). Analysis of factors influencing marketing channel choices by smallholder farmers: A case study of paddy product in wet and dry season of Prey Veng province, Cambodia. *Journal of Sustainable Development*, 13(4), 1–13.
- Coase, R. H. (1937). The nature of the firm. *Economica*, 4(16), 386–405.
- Cragg, J. (1971). Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica*, 39(8), 29–44.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- Degaga, J., & Alamerie, K. (2020). Determinants of coffee producer market outlet choice in Gololcha district of Oromia region, Ethiopia: A multivariate probit regression analysis. *Studies in Agricultural Economics*, 122(2), 104–113.
- De Janvry, A., & Sadoulet, E. (2020). Using agriculture for development: Supply- and demand-side approaches. *World Development*, 133, 105003.
- Dey, S., & Singh, P. K. (2023). Market participation, market impact and marketing efficiency: Integrated market research on smallholder paddy farmers from Eastern India. *Journal of*

- Agribusiness in Developing and Emerging Economies*. Advance online publication. <https://doi.org/10.1108/JADEE-01-2023-0003>
- Dillon, S. M. (1998). Descriptive decision making: Comparing theory with practice. Paper presented at the Proceedings of the 33rd ORSNZ Conference, University of Auckland, New Zealand.
- Dillon, J. L., & Anderson, J. R. (1971). Allocation under uncertainty in the theory of the farm firm. *Journal of Farm Economics*, 53(2), 289–303.
- Dlamini, S. I., & Huang, W. C. (2019). A double hurdle estimation of sales decisions by smallholder beef cattle farmers in Eswatini. *Sustainability*, 11(19), 5185.
- Donkor, E. A., Garnevskaya, E., Siddique, M. I., & Donkor, E. (2021). Determinants of rice farmer participation in the direct marketing channel in Ghana. *Sustainability*, 13(9), 5047.
- Donkor, E., Onakuse, S., Bogue, J., & Rios-Carmenado, I.D.L. (2018). Determinants of farmer participation in direct marketing channels: A case study for cassava in the Oyo State of Nigeria. *Spanish Journal of Agricultural Research*, 16, e0106.
- Ebata, A., & Hernandez, M. A. (2017). Linking smallholder farmers to markets on extensive and intensive margins: Evidence from Nicaragua. *Food Policy*, 73, 34–44.
- Ejionueme, N. G., & Nebo, G. N. (2014). *Understanding Agricultural Marketing*. Immaculate Publications Ltd.
- Endalew, B., Aynalem, M., Assefa, F., & Ayalew, Z. (2020). Determinants of wheat commercialization among smallholder farmers in Debre Elias Woreda, Ethiopia. *Advances in Agriculture*, 7(2), 1–12.
- Endris, E., Haji, J., & Tegegne, B. (2020). Factors affecting vegetable producers' market outlet choice in case of Habru district, North Wollo Zone, Ethiopia. *European Business and Management*, 6(1), 1.
- Fafchamps, M. (2004). *Social Capital and Development*. [Publisher not specified].
- FAO. (2017). *The future of food and agriculture – Trends and challenges*. Food and Agriculture Organization of the United Nations. Available at <https://www.fao.org/3/i6583e/i6583e.pdf>. Assessed on 24 May 2024.
- FAO. (2020). *The state of food and agriculture 2020: Overcoming water challenges in agriculture*. Food and Agriculture Organization of the United Nations. Available at <https://www.fao.org/publications>. Assessed on 24 May 2024.

- FAO. (2021). *OECD-FAO agricultural outlook 2021–2030*. Organization for Economic Co-operation and Development (OECD) & Food and Agriculture Organization of the United Nations Food and Agriculture Organization of the United Nations.
- Ferris, S., Robbins, P., Best, R., Seville, D., Buxton, A., Shriver, J., & Wei, E. (2014). Linking smallholder farmers to markets and the implications for extension and advisory services. *Modern Extension and Advisory Services Brief, 4*, 1–46.
- Fischer, E., & Qaim, M. (2012). Linking smallholders to markets: Determinants and impacts of farmer collective action in Kenya. *World Development, 40*(6), 1255–1268.
- Fischer, E., & Qaim, M. (2014). Smallholder farmers and collective action: What determines the intensity of participation? *Journal of Agricultural Economics, 65*(3), 683–702.
- Fitzgerald, S. P. (2002). *Decision making*. Capstone Publishing.
- Fülöp, J. (2005). Introduction to decision-making methods. Paper presented at the BDEI-3 workshop, Washington.
- Gauthier, P. (2021). Game theory and water management in agriculture: A case of irrigation decisions among Mediterranean farmers. *Water, 13*(8), 1082.
- Gebre, G. G., Isoda, H., Rahut, D. B., Amekawa, Y., & Nomura, H. (2020). Gender gaps in market participation among individual and joint decision-making farm households: Evidence from Southern Ethiopia. *The European Journal of Development Research, 32*, 641–662.
- Gemechu, D., Jaleta, M., Zemedu, L., & Beyene, F. (2024). Impact of membership of seed-producer cooperatives on commercialization among smallholder farmers in the central highlands of Ethiopia. *African Journal of Agricultural and Resource Economics, 19*(1), 54–84.
- Getahun, K., Eskinder, Y., & Desalegn, A. (2017). Determinants of smallholder market participation among banana growers in Bench Maji Zone, Southwest Ethiopia. *International Journal of Agricultural Policy and Research, 5*(11), 169–177.
- Griffin, R. W., & Moorhead, G. (2010). *Organizational Behaviour: Managing People and Organizations* (9th ed.). South-Western Cengage Learning.
- Gujarati, D.N., Porter, D.C., 2009. Basic Econometrics. 5th ed. McGraw-Hill/Irwin, New York.
- Gwiriri, L. C., Bennett, J., Mapiye, C., Marandure, T., & Burbi, S. (2019). Constraints to the sustainability of a ‘systematised’ approach to livestock marketing amongst smallholder cattle producers in South Africa. *International Journal of Agricultural Sustainability, 17*(3), 189–204.

- Habtewold, A. B., Challa, T. M., & Latha, D. A. (2017). Determinants of smallholder farmers in teff market supply in Ambo District, West Shoa Zone of Oromia, Ethiopia. *International Journal of Advanced Research in Management and Social Sciences*, 6(2), 133–140.
- Haidar, A. D. (2016). *Construction program management–decision making and optimization techniques*. Springer.
- Hardaker, J. B., Lien, G., Anderson, J. R., & Huirne, R. B. M. (2015). *Coping with risk in agriculture: Applied decision analysis* (3rd ed.). CABI.
- Hastie, R., & Dawes, R. M. (2010). *Rational choice in an uncertain world: The psychology of judgment and decision making*. Sage.
- Haile, K., Gebre, E., & Workye, A. (2022). Determinants of market participation among smallholder farmers in Southwest Ethiopia: Double-hurdle model approach. *Agriculture & Food Security*, 11(1), 18.
- Hegna, B., & Teshome, A. (2022). Vegetable market supply by smallholder farmers in Ethiopia. *Cogent Social Sciences*, 8(1), 2057058.
- Hussein, K., & Suttie, D. (2016). *Rural-urban linkages and food systems in sub-Saharan Africa: The rural dimension* (IFAD Research Series No. 5). International Fund for Agricultural Development (IFAD). Available at <https://www.ifad.org/en/web/knowledge/-/publication/ifad-research-series-5>. assessed on 14 May 2024.
- Ibikoule, G. E., Lee, J., & Godonou, L. A. (2024). Smallholders’ vulnerability in the maize market: An analysis of marketing channels to improve the role of cooperatives in Benin. *Heliyon*, 10, e27746.
- International Fund for Agricultural Development. (IFAD) (2019). *Creating opportunities for rural youth: 2019 rural development report*. IFAD. Available at <https://www.ifad.org/en/web/knowledge/publication> assessed on 24 August 2024.
- Iheme, D. A. (1996). *The marketing of staple food crops in Enugu State, Nigeria: A case study of rice, maize and beans* (Master’s thesis, University of Nigeria, Nsukka).
- Imolehin, E. D., & Wada, A. C. (2000). Meeting the rice production and consumption demands of Nigeria with improved technologies. *International Rice Commission Newsletter*, 49, 23–41.
- Ingabire, C., Mshenga, P. M., Amacker, M., Langat, J. K., Bigler, C., & Birachi, E. A. (2018). Agricultural transformation in Rwanda: Can gendered market participation explain the persistence of subsistence farming? *Gender and Women’s Studies*, 2(1), 1–18.
- International Rice Research Institute (IRRI). (2020). <https://www.irri.org>.

- Jari, B., & Fraser, G. C. G. (2009). An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, 4(11), 1129–1137.
- Jobber, D. (2009). *Principles and practice of marketing* (5th ed.). The McGraw-Hill Companies.
- Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education*, 118(2), 282–292.
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133.
- Kamai, N., Omoigui, L. O., Kamara, A. Y., & Ekeleme, F. (2020). *Guide to rice production in Northern Nigeria*. International Institute of Tropical Agriculture.
- Kaiser, N., & Barstow, C. K. (2022). Rural transportation infrastructure in low- and middle-income countries: A review of impacts, implications, and interventions. *Sustainability*, 14(4), Article 2149.
- Khapayi, M., & Celliers, P. R. (2016). Factors limiting and preventing emerging farmers to progress to commercial agricultural farming in the King William's Town area of the Eastern Cape Province, South Africa. *South African Journal of Agricultural Extension*, 44(1).
- Keeney, R. L., & Raiffa, H. (1993). *Decisions with multiple objectives: Preferences and value trade-offs*. Cambridge University Press.
- Kilelu, C., Klerkx, L., Omore, A., Baltenweck, I., Leeuwis, C., & Githinji, J. (2017). Value chain upgrading and the inclusion of smallholders in markets: Reflections on contributions of multi-stakeholder processes in dairy development in Tanzania. *The European Journal of Development Research*, 29(5), 1102–1121.
- Kirimi, L., Gitau, R., & Olunga, M. (2013). Household food security and commercialization among smallholder farmers in Kenya. In *Proceedings of the Fourth International Conference of the African Association of Agricultural Economists (AAAE)*, September 22–25. Hammamet, Tunisia.
- Kotler, P., & Keller, K. L. (2016). *Marketing management* (15th global ed.). Pearson Education Limited.
- Kuma, B., Baker, D., Getnet, K., & Kassa, B. (2013). Factors affecting milk market outlet choices in Wolaita Zone, Ethiopia. *African Journal of Agricultural Research*, 8(21), 2493–2501.
- Kyaw, N. N., Ahn, S., & Lee, S. H. (2018). Analysis of the factors influencing market participation among smallholder rice farmers in Magway Region, Central Dry Zone of Myanmar. *Sustainability*, 10(12), 4441.

- Leavy, P. (2017). *Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches*. Guilford Publications.
- Legesse, T., Ashebir, A., Ganewo, Z., Alemu, A., & Samuel, A. (2024). Determinants of market outlet choices by smallholder mango farmers in Aleta Chuko District, Sidama Region, Ethiopia: A multivariate probit approach. *Journal of Innovation and Entrepreneurship*, *13*, 22.
- Levy, P. S., & Lemeshow, S. (1991). *Sampling of populations: Methods and applications* (1st ed.). John Wiley & Sons.
- Macdonald, M. (2019). *The contribution of small-scale fisheries to the community food security of one South African coastal community* (Master's thesis). University of Cape Town, Cape Town, South Africa.
- McFadden, D. (1974). *Conditional logit analysis of qualitative choice behaviour*. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105–142). Academic Press.
- McFadden, D. (1986). The choice theory approach to market research. *Marketing Science*, *5*(4), 275–297.
- Martin, W. E., & Bridgmon, K. D. (2012). *Quantitative and statistical research methods: From hypothesis to results* (Vol. 42). John Wiley & Sons.
- Mango, N., Zamasiya, B., Makate, C., Nyikahadzoi, K., & Siziba, S. (2014). Factors influencing household food security among smallholder farmers in the Mudzi district of Zimbabwe. *Development Southern Africa*, *31*(4), 625–640.
- Mbitsemunda, J. P. K., & Karangwa, A. (2017). Analysis of factors influencing market participation of smallholder bean farmers in Nyanza district of Southern Province, Rwanda. *Journal of Agricultural Science*, *9*(11), 99–111.
- Mdoda, L., Mvelase, L. M., & Maziya, M. (2024). Determinants of marketing channels choices: Evidence from vegetable farmers in the Eastern Cape Province of South Africa. *South African Journal of Agricultural Extension*, *52*(2), 1–20.
- Megerssa, G.R., Negash, R., Bekele, A.E., & Namera, D.B., (2020). Smallholder market participation and its associated factors: evidence from Ethiopian vegetable producers. *Cogent Food & Agriculture*, *6*(1), 1783173.
- Mgale, Y. J., & Yunxian, Y. (2020). Marketing efficiency and determinants of marketing channel choice by rice farmers in rural Tanzania: Evidence from Mbeya region, Tanzania. *Australian Journal of Agricultural and Resource Economics*, *64*(4), 1239–1259.
- Mkuna, E., & Wale, E. (2022). Explaining farmers' income via market orientation and participation: Evidence from KwaZulu-Natal (South Africa). *Sustainability*, *14*(21), 14197.

- Mmbando, F. E., Wale, E. Z., Baiyegunhi, L. J. S., & Darroch, M. A. G. (2016). The choice of marketing channel by maize and pigeonpea smallholder farmers: Evidence from the Northern and Eastern Zones of Tanzania. *Agrekon*, 55(3), 254–277.
- Mmbando, F. E., Wale, E. Z., & Baiyegunhi, L. J. S. (2017). The welfare impacts of market channel choice by smallholder farmers in Tanzania. *Development in Practice*, 27(7), 981–993.
- Morgan, A., Dogbey, E., Arimiyaw, A. W., Foster, A., & Owusu, A. (2019). Effect of road transport accessibility on agricultural produce marketing and livelihoods of farmers in the Kasena-Nankana West District of Ghana. *The Journal of Development Practice*, 5, 39–46.
- Nainabasti, A., & Bai, H. (2009). Rice marketing system and the role of middlemen in Nepal. *Journal of Rural Problems*, 45, 14–23.
- National Bureau of Statistics. (NBS) (2021a). *Basic information document – General household survey panel 2018/19*. Abuja, Nigeria.
- National Bureau of Statistics (NBS). (2021b). *Nigeria gross domestic product report 2020*. <https://www.nigerianstat.gov.ng>
- National Bureau of Statistics (NBS). (2022). *Oyo State population data*. https://citypopulation.de/en/nigeria/admin/NGA031_oyo/.
- Nordhaus, W. D. (2010). Economic aspects of global warming in a post-Copenhagen environment. *Proceedings of the National Academy of Sciences*, 107(26), 11721–11726.
- Oduntan, O. (2024). Assessing the food security status of rice farming households: A case study of Oyo State, Nigeria. *Romanian Journal of Economics*, 59(2(68)), 269–287.
- Ojogho, O. & Izekor O.B. (2019). Impact of Supply-Side Market Participation on Profit of Catfish Farmers in Delta Central Agricultural Zone, Delta State, Nigeria. *Nigerian Agricultural Journal*, 50 (2), 145-152.
- Oladeji, S. O., Olatunji, A. T., Jamiyu, A. G., Ibiroga, O. R., & Ogunola, A. A. (2024). Socioeconomic drivers of food security among smallholder rural household maize farmers in Ido Local Government Area, Oyo State, Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology*, 4(1), 69–176.
- Olwande, J., Smale, M., Mathenge, M. K., Place, F., & Mithöfer, D. (2015). Agricultural marketing by smallholders in Kenya: A comparison of maize, kale and dairy. *Food Policy*, 52, 22–32.
- Oteh, O. U., Agwu, N. M., Okpokiri, C., Aniuga, C., & Ani, L. O. (2018). Rice production and marketing in Nigeria: Assessing regulatory agencies' role in positioning made in Nigeria goods. *Nigerian Agricultural Journal*, 49(2), 143–151.

- Osabohien, R., Matthew, O., Gershon, O., & Ogunbiyi, T. (2020). Credit access and agricultural productivity in Nigeria: A case study of smallholder farmers. *Agricultural Finance Review*, 80(3), 419–436.
- Oyedepo, E. O., & Adekambi, A. A. (2017). Profitability analysis of Ofada rice production in Ogun State, Nigeria. *Journal of Agricultural Science and Environment*, 18(1 & 2), 97–106.
- Owusu, O., & İşcan, T. B. (2021). Drivers of farm commercialization in Nigeria and Tanzania. *Agricultural Economics*, 52(2), 265–299.
- Panda, R. K., & Sreekumar. (2012). Marketing channel choice and marketing efficiency assessment in agribusiness. *Journal of International Food & Agribusiness Marketing*, 24(3), 213–230.
- Pappas, N. (2016). Marketing strategies, perceived risks, and consumer trust in online buying behaviour. *Journal of Retailing and Consumer Services*, 29, 92–103.
- Pesci, S., Galt, R. E., Durant, J. L., Manser, G. M., Asprooth, L., & Pinzón, N. (2023). A digital divide in direct market farmers' online sales and marketing: Early pandemic evidence from California. *Journal of Rural Studies*, 101, 103038.
- Rask, K. J., & Rask, N. (2011). Economic development and food production-consumption balance: A growing global challenge. *Food Policy*, 36, 186–196.
- Robbins, S., & Coulter, M. (2012). *Management: Global edition* (11th ed.). Pearson Education.
- Rosenbloom, B. (2012). *Marketing channels*. Cengage Learning.
- Roy, S. (2016). Various approaches to decision making. In *Decision making and modelling in cognitive science* (pp. 23–49). Springer.
- Satyendra, C., Pandey, P., Modi, V., Pereira, S., & Fosso Wamba, S. (2024). Empowering small farmers for sustainable agriculture: A human resource approach to SDG-driven training and innovation. *International Journal of Manpower*. DOI: <https://doi.org/10.1108/IJM-11-2023-0655>
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education.
- Schmidt, M. C., Kolodinsky, J. M., DeSisto, T. P., & Conte, F. C. (2011). Increasing farm income and local food access: A case study of a collaborative aggregation, marketing, and distribution strategy that links farmers to markets. *Journal of Agriculture, Food Systems, and Community Development*, 1(4), 157–175.
- Secchi, D. (2011). Bounded rationality. In *Extendable rationality* (pp. 19–25). Springer.

- Shewaye, A., Dawit, A., & Lemma, Z. (2016). Determinants of haricot bean market participation in Misrak Badawacho District, Hadiya Zone, Southern Nations Nationalities and Peoples Regional State. *Ethiopian Journal of Agricultural Sciences*, 26(2), 69–81.
- Siddique, M. I., Garnevska, E., & Marr, N. E. (2017). An analysis of marketing channel choice decisions by smallholder citrus growers. *Australian Academy of Business and Economics Review*, 1(1), 50–84.
- Singh, I., Squire, L., & Strauss, J. (1986). *Agricultural household models: Extensions, applications, and policy*. Johns Hopkins University Press.
- Suhonen, N. (2007). *Normative and descriptive theories of decision making under risk: A short review*. University of Joensuu, Finland, Department of Economics and Business Administration.
- Stringer, L. C., Twyman, C., & Gibbs, L. M. (2008). Learning from the South: Common challenges and solutions for small-scale farming. *The Geographical Journal*, 174(3), 235–250.
- Soe, W., Moritaka, M., & Fukuda, M. (2015). An analysis of the factors influencing marketing channel choice by paddy rice farmers in Myanmar. *Journal of the Faculty of Agriculture, Kyushu University*, 60(2), 535–542.
- Tewoderos, M., Degye, G., & Bosena, T. (2020). Determinants of sorghum market participation among smallholder farmers in Kafta Humera District, Tigray, Ethiopia. *South Asian Journal of Social Studies and Economics*, 8(1), 1–13.
- Thamthanakoon, N., Huang, I., Eastham, J., Ward, S., & Manning, L. (2021). Factors driving Thailand rice farmer decision making in the choice of marketing channel. *British Food Journal*, 124, 331–349.
- Tian, T., Su, Y. Y., & Chen, P. (2025). Small profits mean peace: Food price, risk aversion, and farmers' choices of sale channels. *Frontiers in Sustainable Food Systems*, 9, 1501600.
- Tinsley, R. (2012). *Rice value chain analysis – Sokoto State, Nigeria (NIG 244)*. Winrock International Nigeria Farmer-to-Farmer Program.
- Tunde, A. M., & Adeniyi, E. E. (2012). Impact of road transport on agricultural development: A Nigerian example. *Ethiopian Journal of Environmental Studies and Management*, 5(3).
- Van Bruggen, G. H., Kacker, M., & Nieuwlaat, C. (2005). The impact of channel function performance on buyer–seller relationships in marketing channels. *International Journal of Research in Marketing*, 22(2), 141–158.
- Von Loeper, W., Musango, J., Brent, A., & Drimie, S. (2016). Analysing challenges facing smallholder farmers in conservation agriculture in South Africa: A system dynamics approach. *South African Journal of Economic and Management Sciences*, 19, 747–773.

- White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48 (4), 817–838.
- Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. Free Press.
- Wilson, E., Kenny, A., & Dickson-Swift, V. (2018). Ethical challenges of community-based participatory research: Exploring researchers' experience. *International Journal of Social Research Methodology*, 21(1), 7–24.
- Wooldridge, J.W. (2002). *Econometric Analysis of Cross Section and Panel Data*. MIT Press, Cambridge, Massachusetts.
- Wooldridge, J.W. (2003). *Econometric Analysis of Cross Section and Panel Data*. MIT Press, USA.
- World Bank. (2021). *Agriculture and Food*. Available at <https://www.worldbank.org/en/topic/agriculture/overview> assessed on 24 May 2024.
- Yigezu, Y. A., Alwang, J., Shiferaw, B., Haile, M., Kassie, M., & Jaleta, M. (2018). Enhancing the adoption of agricultural technologies requiring high initial investment among smallholders. *Technological Forecasting and Social Change*, 134, 199–206.
- Zhang, X., Qing, P., & Yu, X. (2019). Short supply chain participation and market performance for vegetable farmers in China. *Australian Journal Agriculture and Resource Economics*, 63, 282–306.
- Zivenge, E., & Karavina, C. (2012). Analysis of factors influencing market channel access by communal horticulture farmers in Chinamora District, Zimbabwe. *Journal of Development and Agricultural Economics*, 4(6), 147–150.



17 December 2024

Ajibade Olumuyiwa Adeoye (224185361)
School of Agri Earth & Env Sc
Pietermaritzburg Campus

Dear AO Adeoye,

Protocol reference number: HSSREC/00007935/2024

Project title: Welfare impact of rice marketing channels among smallholder rice farmers in Oyo state, Nigeria
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 04 November 2024 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted FULL APPROVAL.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

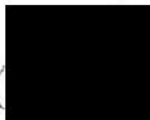
Incidents of adverse events and serious adverse events (AEs and SAEs) should be reported in writing to HSSREC, the study sponsors, and any regulatory authority (where appropriate), within 7 working days of the occurrence for local sites and 14 days for all other South African sites.

This approval is valid until 17 December 2025.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)
/dd

Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X54001, Durban, 4000, South Africa

Telephone: +27 (0)31 260 8350/4557/3587 Email: hssrec@ukzn.ac.za Website: <http://research.ukzn.ac.za/Research-Ethics>

Founding Campuses:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

INSPIRING GREATNESS

APPENDICE A: QUESTIONNAIRE



RESEARCH QUESTIONNAIRE

RESEARCH TOPIC: WELFARE IMPACT OF RICE MARKETING CHANNELS AMONG SMALL-HOLDER RICE FARMERS IN OYO STATE, WESTERN NIGERIA.

INTRODUCTION AND CONSENT

Dear Sir/Ma,

Please introduce yourself to the respondent: My name is..... I am an enumerator collecting data on behalf of Ajibade Olumuyiwa Adeoye, a Postgraduate student at the University of KwaZulu-Natal, South Africa. The study aims to examine **Determinants and Welfare Impact of Market Participation and Marketing Channel choice among Smallholder Rice Farmers in Oyo State Nigeria**. Your cooperation in responding to these questions will be highly appreciated. The information so given will strictly be used for academic purposes and in utmost confidence. In the process of the interview, you are free to interrupt me and ask for any clarification. You have the liberty or legal right to call the principal researcher (Mr. Ajibade Olumuyiwa Adeoye) on the mobile number [REDACTED] and ask for any clarification at any point in time. I respect all the responses you give and appreciate your cooperation.

Would you like to participate in this survey? 1 = Yes 2 = No

LETTER OF CONSENT

I..... (full name of participant) from..... (full name of company/organization/farm business), in the position of (designation), hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participate in the research project.

I understand that I can withdraw from the survey at any time if I so desire.

Please check the relevant box below:

I request anonymity for my name and the name of my company/farm business []

SIGNATURE OF PARTICIPANT AND DATE

.....

Instruction: Please tick [] where applicable in the boxes provided for your appropriate responses and state in writing other information where necessary. There is no wrong or right answer to these questions. You are free to be or not part of this survey, and you can withdraw from the survey anytime you feel like doing so. However, your cooperation is greatly appreciated.

IDENTIFICATION INFORMATION

1. Name of Enumerator	
2. Date of interview	
3. State	
4. Administrative Zone	
5. Local Government	
6. Village/Town	
7. GPS Co-ordinates	Longitude: _____ (E) Latitude: _____ (N)

A. FARMERS' INFORMATION

Variable	Response	Codes
Demographic data		
1. Gender of rice farmer		[0] Female [1] Male
2. Age of the rice farmer		
3. Are you the household head		[0] No [1] Yes
4. If not the household head, the relationship to him/her		
5. Gender of the rice farmer		[0] Female [1] Male
6. Age of rice farmer (actual)		
7. Marital status of the rice farmer		[1] Single [2] Married [3] Separated / Divorced [4] Widowed [5] Monogamy [6] Polygamy [99] Others, specify _____
8. Number of males aged below 16 years		
9. Number of females aged below 16 years		
10. Number of males aged 16 years and above		
11. Number of females aged 16 years and above		
12. Number of males aged 59 and above		
13. Number of females aged 59 and above		
14. Household size (in numbers)		
15. Do you have a formal education?		[0] No [1] Yes
16. The education level of the rice farmer		[1] No formal education [2] Formal Education [3] Some primary education [4] Completed primary education [5] Vocational training [6] Completed vocational training [7] Secondary school education [8] College of Education [9] University Education
17. The highest level of education attained by the rice farmer?		
18. What is the primary activity of the rice farmer?		[1] Agricultural related activity [2] Formal private employment [3] Public sector employment

		[4] Artisans [5] Retired [99] Others
19. What is the secondary activity of the rice farmer?		
20. Years of experience in rice farming		

B. FARM CHARACTERISTICS & ASSETS ENDOWMENT FACTORS

1. What is the total farm size for growing rice (acres) _____

2. Who owns the rice farm?

[1] Owner [2] Rent [3] Owned by Government

3. How do you transport rice to the processor? _____

[1] Vehicle [2] Tractor [3] Motorbike [4] Bicycle [5] Carry on the head [99] Others: _____

4. What is the main channel? _____

[1] Rice miller [2] Wholesaler [3] Broker [99] Others. Please specify: _____

5. Who determines the prices of rice produce? _____

[1] Buyer [2] Farmers' Association [3] Sellers

6. What is the level of satisfaction with the prices you receive for the rice produce _____

[1] High [2] Medium [3] Low

7. What major factor determines the price you receive for your rice farm produce _____

[1] seasonality or availability of produce [2] Bargaining/negotiation strength of buyers [3] Lack of marketing information [4] Lack of transport means [99] others: _____

8. How far is your home from the rural rice processor?

[] Distance from home to rural rice processor: Minutes _____ Kilometres _____

[] Distance from home to urban rice processor: Minutes _____ Kilometres _____

9. Which of these transport assets do you own? Tick all applicable options.

[1] Vehicles [2] Tractor [3] Motorbike [4] Bicycle

10. What communication assets do you have? Tick all applicable options.

[1] Radi [2] TV set [3] Mobile phone [4] others: _____

11. What is your total annual income from rice? _____

12. What rice product did you sell? _____

[1] Paddy rice [2] Milled rice [3] Both

13. What channel did you use to sell your paddy rice?

Market channel	Tick (√)	Quantity sold (50kg bag)	Price/50kg bag
[1] Rice Millers			
[2] Wholesalers			
[3] Brokers			
[4] Others, please specify...			

C. INSTITUTIONAL CHARACTERISTICS

Please, supply information on the financial resources used in production in the last 12 months

1	Did you use personal savings for your rice business in the last productive season?	[1] Yes [0] No
2	Did you obtain a loan for your rice business in the last production season?	[1] Yes [0] No>>> Skip to the next section
3	Sources of loans and amount applicable to each source <i>Complete all that apply</i>	[1] Commercial banks _____ [2] Cooperative societies _____ [3] Local groups _____ [4] Religious associations _____ [5] Friends and Families _____ [6] NGOs _____ [99] Others (specify) _____
4	What is the total amount of loans obtained from all sources in the last productive season?	

5	Loan sources	Banks	Cooperative societies	Local groups	Religious associations	Friends and families	NGOs	Others (specify)
6	How many times have you requested for loan from these sources in the last production season? (₱)							
7	How long did it take you to process the loan obtained by the source in the last production season?							
8	How many times was your loan request granted from these sources in the last production season? (₱)							
9	What is the annual interest rate (in %) on loans sourced in the last production season?							
10	What is/was the loan repayment time by source?							
11	How much of the loan obtained in the last production season have you repaid by source? (₱)							

D. TRANSACTIONAL/DETERMINANT OF THE CHOICE OF RICE MARKETING CHANNELS AMONG SMALLHOLDER FARMERS

The Choice of Marketing Channel Utilized and the Reasons for its Adoption.

Please rate One frequency level by cycling the selected one of the listed numbers below.

- 1 = Did not sell to this channel
- 2 = Rarely, in less than 10% of transactions
- 3 = Occasionally, in about 30% of transactions
- 4 = Sometimes, in about 50% of transactions
- 5 = Frequently, in about 70% of transactions

6 = Usually, in about 90% of transactions

7 = Frequently used, in more than 90% of transactions

Put (√) only channel(s) you use and circle ○ the level of frequency		1= Did not use --> 7= Frequently use						
What channels did you use and how often did you use the channel(s) during the period between 2023 and 2024?								
	1. Rice miller	1	2	3	4	5	6	7
	2. Wholesaler	1	2	3	4	5	6	7
	3. Broker	1	2	3	4	5	6	7
	4. Others, please specify...	1	2	3	4	5	6	7

What channels did you use and how often did you use the channel(s) from the year 2023 until now (2025)?								
	1. Rice miller	1	2	3	4	5	6	7
	2. Wholesaler	1	2	3	4	5	6	7
	3. Broker	1	2	3	4	5	6	7
	4. Others, please specify...	1	2	3	4	5	6	7

Please rate One frequency level by cycling ○ the selected one of the listed numbers below.

1 = Most unlikely 2 = Unlikely 3 = Somewhat unlikely 4 = Neutral

5 = Somewhat likely 6 = Likely 8 = Most likely

Statements		1= Most unlikely -----> 7= Most likely						
I intend to sell to the market channel(s) as listed below. Please answer any channel(s) that you want to use.								
	1. Rice miller	1	2	3	4	5	6	7
	2. Wholesaler	1	2	3	4	5	6	7
	3. Broker	1	2	3	4	5	6	7
	4. Others, please specify...	1	2	3	4	5	6	7

**E. Challenges/Factors Affecting the Choice of Marketing Channel (s).
Goals and Values of Marketing**

What are your goals for selling rice?

Please rate One of the levels of importance by circling one of the numbers.

1 = Not at all important, 2 = Low importance, 3 = Slightly important, 4 = Neutral,
5 = Moderately important, 6 = Very important, 7 = Extremely or most important

Goals and Values of Farmers		1= Not at all important -> 7 Most important						
	1. Maximizing profit by selling at a higher price	1	2	3	4	5	6	7
	2. Maximizing profit by minimizing the cost of selling	1	2	3	4	5	6	7
	3. Enhancing cash flow	1	2	3	4	5	6	7
	4. Having a sense of achievement or self-fulfilment through selling	1	2	3	4	5	6	7
	5. Independence- freedom to sell	1	2	3	4	5	6	7
	6. Family's well-being	1	2	3	4	5	6	7
	7. Continuing the family tradition	1	2	3	4	5	6	7
	8. Belonging to the farming community or farmer group	1	2	3	4	5	6	7

F. Please answer the questions followed by the market channel(s) that you use now.

If you use more than one channel, could you please answer these questions related to that channel?

For instance, if you are selling to two marketing channels: Miller and Coop, kindly write MILLER as the channel's name and respond to the questions on page 12. Then, do the same for COOP by writing its name and answering the questions on the subsequent page. If you sell to four channels, please answer the questions across four pages similarly.

By circling one of the numbers, please rate ONE level of the agreement that best reflects your opinion based on only the current market channel(s) you choose.

1 = Strongly disagree

2 = Disagree

3 = Somewhat disagree,

4 = Neutral

5 = Somewhat agree

6 = Agree

7 = Strongly agree

N/A = Not applicable, Not available, No answer, or Not relevant

Sell to (please write)	1= Strongly disagree <input type="radio"/> -> 7= Strongly agree							N/A
	1	2	3	4	5	6	7	
1. This channel offered me a <u>higher price</u>								
2. This channel offered me a <u>cash payment</u>								
3. It is <u>cheaper to transport</u> my product to this channel								
4. This channel is <u>easily accessible/convenient</u> to me								
5. This channel <u>buys any quantity of rice</u>								
6. This channel <u>buys any type of rice</u>								
7. This channel offered me <u>monetary incentives</u>								
8. This channel offered me <u>non-monetary incentives or good services</u>								
9. I chose this channel because <u>I trusted</u> this channel								
10. I chose this channel because I don't have to worry about being <u>cheated on a weighing scale</u>								
11. I chose this channel because I don't have to worry about being <u>cheated on a rice grade assessment.</u>								

12. I chose this channel because this channel <u>treated me fairly.</u>	1	2	3	4	5	6	7	
13. I chose this channel because this channel <u>treated me fairly.</u>	1	2	3	4	5	6	7	
14. In general, <u>I am skeptical of the information</u> I received from this channel	1	2	3	4	5	6	7	
15. I chose this channel because I <u>don't have any choice</u>	1	2	3	4	5	6	7	
16. I <u>can negotiate</u> with this channel. (e.g. price, payment, grading)	1	2	3	4	5	6	7	
17. I must sell to this channel because I have a contract with them	1	2	3	4	5	6	7	
18. I must sell to this channel because I am <u>in debt with them</u> (e.g. loan, repay farm inputs)	1	2	3	4	5	6	7	
19. I have a <u>good relationship</u> with this market channel	1	2	3	4	5	6	7	
20. I have been <u>familiar</u> with this channel	1	2	3	4	5	6	7	
<u>21. Most of my friends</u> who are rice farmers sell on this channel	1	2	3	4	5	6	7	
<u>22. My family</u> thinks I should sell to this channel	1	2	3	4	5	6	7	
<u>23. Rice harvest machine drivers or truck drivers</u> I am in contact with think I should sell to this channel	1	2	3	4	5	6	7	
<u>24. Government officers or the head of the village</u> I am in contact with think I should sell to this channel	1	2	3	4	5	6	7	
25. Mass media recommended this channel	1	2	3	4	5	6	7	
26. This channel is a <u>good choice</u> for me	1	2	3	4	5	6	7	
27. Overall, <u>I am satisfied</u> or happy with this channel	1	2	3	4	5	6	7	

What recommendations do you have for developing a market channel?

.....

Thank you very much for your kind cooperation.

Appendix A2. Household Food Insecurity Access Scale (HFIAS) Questions

Standard label	Question
WORRIED	Were you worried that your household would not have enough food to eat?
HEALTHY	Were you unable to eat healthy and nutritious (balanced) meals due to lack of resources?
FEWFOODS	Did you or any household member eat only a few kinds of food due to lack of variety?
NONPREFERRED	Did you have to eat foods that you did not prefer because of limited resources?
SKIPPED	Did you or any household member have to skip a meal during the day because there was not enough food?
REDUCEDSIZE	Did you eat smaller portions of food or eat less than you felt you needed because there was not enough food?
NOFOOD	Was there ever no food at all in your household due to lack of resources?
HUNGRY	Were you hungry but did not eat because there was not enough food?
WHOLEDAY	Did you or any household member go a whole day and night without eating anything because there was not enough food?

Source: Adapted from Coates, J., Swindale, A., & Bilinsky, P. (2007).