

**CZECH UNIVERSITY OF LIFE SCIENCES
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Faculty of Tropical AgriSciences



**Communication and Group Dynamics of Producer
Cooperatives in Export-Oriented Value Chains: A Study of
Cashew Farmers in Sub-Saharan Africa**

DISSERTATION THESIS

Author: Ing. Gospel Ayodele Iyioku

Thesis supervisor: Ing. Jana Mazancová, Ph.D.

Thesis Consultant: Ing. Jiří Hejkrlík, Ph.D.

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Declaration

I hereby declare that I have completed this thesis entitled **“Communication and Group Dynamics of Producer Cooperatives in Export-Oriented Value Chains: A Study of Cashew Farmers in Sub-Saharan Africa”** independently. All texts in this thesis are original, and that all information sources have been quoted and acknowledged by means of complete references and in accordance with the Citation rules of the Faculty of Tropical AgriSciences. I also confirm that this work has not been previously submitted, nor is it currently submitted, for any other degree, to this or any other university.

Furthermore, I confirm that I have used AI tools in full compliance with the internal regulations of the Czech University of Life Sciences and in accordance with the principles of academic integrity and ethics. AI tools were used exclusively for language editing, stylistic improvement, structuring of text, and assistance with formulation. No AI tools were used for data analysis, data generation, interpretation of results, or production of original empirical findings. All analytical procedures, interpretations, and conclusions presented in this thesis are my own work.

In Prague, 2026

Ing. Gospel Ayodele Iyioku

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Abstract

Agricultural cooperatives are recognised as instruments for enhancing market access, bargaining power, and resilience; but widespread low levels of participation constrain the development and potential of these cooperatives. Hence, there is a need to understand the multifaceted determinants of farmer participation in collective action in order to develop inclusive and effective rural institutions. This dissertation examined drivers of cashew farmers' participation in farm-level agricultural cooperatives using Kenya and Nigeria as strategically selected case studies. The primary focus on cashew was important due to the high export value of the commodity, the smallholder dominance, and the specific challenges they face (e.g., price volatility and access to inputs), where collective action offers a potential way to improve livelihoods and integrate farmers in the value chain. The study employed a mixed-methods data collection and analytical procedure. Data was collected from 249 active cashew farmers (154 males, 95 females) in Kenya and 321 (247 males, 74 females) in Nigeria. Using Probit regression analysis, Structural Equation Modelling (SEM) and Chi-Square tests, results showed that the level of education of farmers and their access to agricultural information are key enablers that influence farmers' intentions to join in Kenya, with bridging social capital (formal sources of providing information) and formal delivery channels facilitating the diffusion of knowledge and trust-building, leading to membership intentions among farmers. In the Nigerian context, the intensity of commercialisation was seen as a crucial driver, where established farmers with larger farms and focus on a single crop as main income source, influencing intention to join. Additionally, intentions to join is facilitated through formal information sources and trusted social individuals. This makes formal information sources the primary validator of cooperative legitimacy where credibility of the information provider/source overrides the channel through which the information is delivered in Nigeria. Subjective norms, that is, pressure from influential individuals, had a significant impact on collective action in both case studies, although they manifested differently through community expectations in Kenya and within pre-existing traditional social structures in Nigeria. While results showed no gender disparity in male and female farmers' means of information access and delivery channels in both case studies, the persistent structural limitations in literature highlight the need for directed inclusivity measures. Findings from this study highlight important context-specific policy implications. In Nigeria, the promotion of cooperatives requires using existing social hierarchies by enrolling respected leaders as champions, whereas in Kenya, the success in cooperative membership rely on structured formal systems such as participatory trainings that builds institutional trust. Extension services, whether public or private, must be adapted to specific psychological pathways, that is, through direct, formal dissemination of knowledge in Kenya or community-oriented education through trusted and important figures in

Nigeria. For future studies, a multi-country and multi-commodity comparative approach is recommended to determine the cause and effect while also enhancing the generalizability of the results. Overall, this study contributes to broader discussions on collective action, market integration, and rural inclusive development in sub-Saharan Africa.

Keywords: Agricultural cooperatives; Cashew value chains; Theory of Planned Behaviour; Social capital; Kenya; Nigeria; Smallholder farmers; Collective action

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List of abbreviations

ABP	-	Anchor Borrowers' Programme
ACA	-	African Cashew Alliance
ACi	-	African Cashew Initiative
APP	-	Agricultural Promotion Policy
ATT	-	Attitude
AVE	-	Average Variance Explained
CAGR	-	Compound annual growth rate
CAPI	-	Computer-Assisted Personal Interviewing
CB-SEM	-	Covariance-based Structural Equation Modelling
CFA	-	Confirmatory Factor Analysis
CFI	-	Comparative Fit Index
CNSL	-	Cashew-nut-Shell Liquid
MOVE-	-	Competitive Cashew Initiative
CR	-	Composite Reliability
DF	-	Degree of Freedom
DV	-	Divergent Validity
EFF	-	Empowering Farmers Foundation
FAO	-	Food and Agriculture Organisation
FAOSTAT	-	Food and Agriculture Organisation Statistics
FFS	-	Farmer Field School
FMARD	-	Federal Ministry of Agriculture and Rural Development
GAP	-	Good Agricultural Practices
HTMT	-	Heterotrait-monotrait
ICA	-	International Co-operative Alliance
ICT	-	Information and Communication Technologies
INT	-	Intention
IPM	-	Integrated Pest Management
KARLO	-	Kenya Agricultural and Livestock Research Organisation
KCSAP	-	Kenya Climate Smart Agriculture Project
KES	-	Kenyan Shilling
KNBS	-	Kenya National Bureau of Statistics
LGA	-	Local Government Area
MAL	-	Ministry of Agriculture & Livestock

ML	-	Maximum Likelihood
MLR	-	Maximum Likelihood Robust
MoALF	-	Ministry of Agriculture, Livestock and Fisheries
NAICPP	-	National Accelerated Industrial Crops Production Program
NATIP	-	National Agricultural Technology and Innovation Policy
NCAN	-	National Cashew Association of Nigeria
NEPC	-	National Export Promotion Council
NEPC	-	National Export Promotion Council
NGO	-	Non-governmental organizations
OSCCU	-	Ogun State Cassava Co-operative Union
PBC	-	Perceived Behavioural Control
PHL	-	Post-harvest losses
PLS	-	Partial Least Squares
PSM	-	Propensity Score Matching
RCN	-	Raw cashew nuts
RMSEA	-	Root Mean Square Error Approximation
RUT	-	Random Utility Theory
SACCO	-	Savings and Credit Cooperative Organisation
SAPZ	-	Special Agro-Industrial Processing Zones
SCT	-	Social Capital Theory
SEM	-	Structural Equation Modelling
SME	-	Small and Medium Enterprises Development Agency
SMEDAN	-	Small and Medium Enterprises
SRMR	-	Standardised Root Mean Square Residual
SSA	-	Sub-Saharan Africa
SUB NORM	-	Subjective norms
TCU	-	Tree Crop Unit
TLI	-	Tucker-Lewis Index
TPB	-	Theory of Planned Behaviour
UNCTAD	-	UN Trade and Development
USDA	-	United States Department of Agriculture

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1. Introduction

Agriculture remains one of the most crucial part of economic growth in Africa. This economic growth is impacted by cash crops through their contributions to foreign exchange earnings, employment, and the government's taxable earnings from export duties (Bjornlund et al. 2020; Jayne & Sanchez 2021). Commodities such as cashew, cotton, cocoa, coffee, and tea are instrumental in financing imports and stabilising economies (Ntavoua 2021; Otaigbe & Onyeukwu 2022). Unfortunately, these subsectors are burdened with challenges that manifest in the inefficient use of and high-priced inputs, climate change, limited access to markets, and post-harvest losses (Danso-Abbeam et al. 2021; Rwigema 2021; Stephane et al. 2021; Eze et al. 2023). This is especially true in agrarian economies, where smallholder farmers are the predominant group.

Globally, cashew production has experienced a significant shift and consistent growth geographically as a result of the rising demand for plant-based diets and confectionery (Springmann et al. 2021; Olaitan P. et al. 2023). Hence, there has been a global increase in the demand and production of cashew nuts. As of 2022, global production (in shell) was 3.85 million metric tons (up from 3.65 million metric tons in 2020) (FAOSTAT 2024). Historically, cashew production was concentrated in East Africa and India. This production has since expanded to 46 other countries, including those in the SSA region, which account for almost 58% of the global total (FAOSTAT 2024). Côte d'Ivoire is the world's largest single producer (FAOSTAT 2024). Still, the global value chain is mainly characterised by a distinct division where countries in Africa dominate raw nut production, supplying more than half of the global output (MOVE-ComCashew 2019). On the other side of the value chain are countries in Asia, particularly Vietnam and India, which are leaders in terms of cashew processing and the export of kernel value-added products (Patil 2016; Malhotra et al. 2017). Recently, a key development has been the concerted effort by African countries to capture more value by building domestic processing capacity, which enables them to move beyond raw material exports and compete in the lucrative and expanding kernel market (Adesanya et al. 2021; Anthony 2021). This transition is actively supported by several government policies and initiatives such as export restrictions on raw cashew nuts across Côte d'Ivoire, Benin and Ghana; direct investments and fiscal incentives for processors through regulating bodies like the National Cashew Association of Nigeria (NCAN) in Nigeria and VAT exemptions on equipment and subsidised utilities for registered cashew processing companies across SSA; the development of local value chains and cooperatives such as the GIZ's ComCashew across SSA countries like Ghana and Côte d'Ivoire; and lastly, regional collaboration and donor-funded

programs like the Competitive Cashew Initiative (MOVE-ComCashew), the African Cashew Alliance (ACA) and the Prosper Cashew Project in West Africa (MOVE-ComCashew 2019; Wittern et al. 2023).

Some African cashew producers, including Côte d'Ivoire, Benin, Burkina Faso, Ghana, Mozambique, and Nigeria, have benefited from the MOVE-ComCashew. Since 2009, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and international donor collaborations program have promoted the development of the cashew sector through increased production, processing, and marketing of cashews (MOVE-ComCashew 2019). According to reports as of 2019, MOVE-ComCashew has trained more than 620,000 farmers in the Good Agricultural Practices (GAP) framework, which resulted in an 86% productivity increase and improvement in the quality of cashew nuts produced (Wittern et al. 2023). Local processing capacity has also expanded from 50,000 to 384,657 metric tons (between 2008 and 2019), creating more than 38,000 jobs (68% of which are held by women) (MOVE-ComCashew 2019), enabling a shift from raw exports to value-added products that boosted profitability (Kollesuah et al. 2020).

SSA countries such as Tanzania, Kenya, and Nigeria have launched a number of initiatives, positioning cashew nuts as a strategic export crop. In a bid to empower farmers and strengthen their bargaining power, especially the resource-poor farmers, these initiatives have supported with providing technical assistance, cooperative development, and access to credit (Adesanya et al. 2021; Anthony 2021). Kenya's Empowering Farmers Foundation (EFF) launched the Korosho Ni Maisha project in 2021, which is set to become a 5-year program aimed at revitalising the coastal cashew value chain. This initiative targeted 3,300 smallholders in Kilifi County, with the aim to increase the income of farmers by providing agronomic training, improved seedlings, market linkages, and also access to markets (Abubakar & Mutundu 2024). Improvement of Nigeria's cashew industry is supported by two remarkable projects, the MOVE-ComCashew and the Prosper Cashew Project. While the main focus of MOVE-ComCashew centres on providing training in GAP and facilitating the establishment of processing facilities, the Prosper Cashew project takes a more modern approach. Prosper Cashew, which was launched in 2020, aims to revitalise and strengthen existing cashew processing facilities improving efficiency and competitiveness in the value chain, which is a contemporary approach to the industry (USDA 2021). It creates economic opportunities and strengthens the cashew value chain in Nigeria by improving access to working capital and enhancing investment in the sector (USDA 2021).

Although producing significantly less than leading producers like the Ivory Coast, Nigeria and Kenya still provide interesting case studies on the revitalisation of the cashew sector. According to the literature, cashew production in Kenya during the 1970s and 1980s was mainly attributed to the government's heavy investment in

extension services, which led to the adoption of improved farming techniques (Davis & Place 2003; Evans 2014), processing facilities, such as Kenya Cashew Nut Limited, integrated value-added processing, and the provision of input (fertilizers and seedlings) increased productivity (Mwangi et al. 2013). These factories also employed many women, especially in the processing of cashew nuts (Mwangi et al. 2013). In Nigeria, factors such as government policies and initiatives, including the National Accelerated Industrial Crops Production Program (NAICPP) from 1994 to 2000, significantly expanded the cashew sector (Ezeagu 2002). This program provided farmers with modern seedlings and access to extension services that demonstrated modern techniques. The NAICPP provided farmers with improved seedlings and access to agricultural extension services that demonstrated modern agricultural techniques. According to authors, this sustained period of growth was also as a result of favourable export prices due to increasing global demand for cashews (Olukunle 2015; Ogunwolu et al. 2023), propelling Nigeria to become one of Africa's top cashew producers by the early 2000s.

The collapse of the cashew processing facilities, the liberalisation of markets in the 1990s, which removed government price controls and support mechanisms, poor tree management, and the powdery mildew outbreak, caused a decline in Kenya's production (Gambo 2013; Mwangi et al. 2013). In the case of Nigeria, the decline in cashew production was due to ageing cashew trees, poor weather, a decrease in government investment, which resulted in less access to vital inputs such as improved seedlings, inadequate processing facilities, and poor infrastructure (Ezeagu 2002; Olukunle 2015; Anthony 2021). These factors impacted the export industries and the livelihoods of farmers in both countries (Olukunle 2015; Ogunwolu et al. 2020).

Based on their status as "giants" of trade and economy within their regional blocs, both Kenya and Nigeria have the resources to execute extensive agricultural policies in Africa, according to the African Development Bank (2023). This capacity distinguishes them from less-resourced cashew producers in their regions. It makes them critical case studies for examining governmental strategies to revitalise cashew value chains, which in turn makes them important case studies for assessing government efforts to revitalise cashew value chains. Both countries have adopted policies to transition from raw cashew exports to promoting local value addition. This goal has been pursued through a series of long-standing initiatives in Nigeria. The Agricultural Transformation Agenda (ATA) established a foundation for this agricultural reform. Building on this, the Agricultural Promotion Policy (APP) (2016-2020) further advanced these goals. The current agricultural policy in Nigeria, the National Agricultural Technology and Innovation Policy (NATIP) (2022-2027), explicitly focuses on creating a more robust framework for transformation, with emphasis being placed on modernisation through 21st-century technologies, digital innovations and climate-smart agriculture (FMARD 2022). NATIP also seeks to

improve value chains by creating Special Agro-Industrial Processing Zones (SAPZs), revitalising cooperatives to enhance market access and resource pooling, and promoting private sector investment into rural processing infrastructure (FMARD 2022). On the other hand, the cashew revitalisation strategy is integrated into the Big Four Agenda in Kenya. This strategy is captured in the manufacturing and food security objectives in cashew processing (Olukunle 2015; Farm Africa 2022). The government's investment in county-level processing factories is to add value, create employment opportunities, and increase export earnings. These countries both support farmers with improved seedlings, technical training, access to agricultural extension services, and provision of inputs. In Nigeria, this support is captured under the National Cashew Development Program as well as the National Export Promotion Council (NEPC) Cashew Program (Olaitan et al. 2023), while in Kenya, the support is captured under the Kenya's Climate Smart Agriculture Project (KCSAP) Programme under the Big Four Agenda (KNBS 2021). Despite these shared approaches, the scope and historical context of the policies differ. While Nigeria has always strategically positioned cashew as an export crop, Kenya's cashew revitalisation efforts, aimed at increasing processing and exports, are relatively more recent, after years of neglect, after the sector reached its peak in the 1980s (Liverpool-Tasie & Takeshima 2013).

Mirroring a rising policy convergence, foreign donors as well as the governments of Kenya and Nigeria are increasingly prioritising collective action in the form of formal producer groups like cooperatives, a vital tool for sustainable cashew value chain development (KNBS 2021; FMARD 2022; Eze et al. 2023). These producer groups function as:

- informal associations (for example, labour-sharing groups and savings circles) enable basic resource pooling.
- semi-formal entities (for example, Savings and Credit Cooperative Organisations (SACCOs) provide financial services with limited governance.
- formal cooperatives, including marketing cooperatives (collective sales/market access), production cooperatives (shared farming), and multipurpose cooperatives (Markelova & Meinzen-Dick 2009; Mathuva 2016).

This thesis focuses on cashew marketing cooperatives (defined as organised groups of cashew farmers that help members of the group export their harvests by negotiating contracts, quality control, and buyer integrations through collective sales). These cooperatives help alleviate the challenges faced by smallholder farmers, such as high transaction costs, market isolation, weak engagement from buyers, trust issues, and weak bargaining power (UNCTAD 2015; Economic Development in Africa Report 2023). Although contract farming helps farmers with guaranteed markets and inputs, it often overlook the smallest farmers, thus contributing to power imbalances,

and increasing buyer default risks (Barrett et al. 2012). Unlike contract farming, producer groups, such as marketing cooperatives, offer a more equitable alternative within Kenya and Nigeria's cashew industries. In Kenya and Nigeria's cashew industries, marketing cooperatives are the entry points for farmers to integrate into the global value chains. They aid farmers' access to markets, foster direct relationships with quality-conscious buyers, and thus reduce farmers' reliance on intermediaries. They also empower women through resource pooling and collective bargaining, helping to control the position of intermediaries in the value chain (Markelova & Meinzen-Dick 2009; Markelova & Mwangi 2010; Olwande et al. 2015). While Kenya and Nigeria possess the capacity to design and implement supportive policies for producer groups, a key question arises: why do cashew farmers face participation challenges, and how can policies be more effectively designed to increase engagement?

Both Kenya and Nigeria, to various degrees, present a challenge to the participation of farmers in formal producer groups (like agri-cooperatives) in the literature. While cognitive barriers resulting from past experiences are profound in the case of Kenya (Mutonyi 2019; Adesanya et al. 2021; Miroro et al. 2023), in Nigeria, the challenge to participation include farmers' lack of awareness of the benefits of cooperatives, issues of distrust stemming from past failures resulting from mismanagement or corruption, and insufficient economic incentives that should outweigh the perceived risks of joining (Hussain 2014; Abdullahi et al. 2020). Hence, farmers intention to participate in cooperatives extend beyond simple economic considerations. It involves subconscious social and psychological factors, with women often facing additional barriers to engagement (Meier zu Selhausen 2016; Jitmun et al. 2020; Cele 2022). This challenge, according to authors such as Shiferaw et al. (2016), Apata & Yusuf (2022), Nnahiwe et al. (2023) and Obianefo et al. (2023), justifies the predominance of informal groups among farmers, where resource sharing and knowledge transfer happens without the risks associated with membership in formal groups like agri-cooperatives.

Based on this context, the overall objective of this thesis is to examine the farmer, farm and household, institutional, and psychological determinants of smallholder cashew farmers' intentions to join formal export-oriented cooperatives in Kenya and Nigeria. The thesis advances this objective through three specific objectives which altogether addresses (i) the influence of farmer, farm and household characteristics, social capital and communication dynamics on cooperative membership intention, (ii) the psychological determinants of that intention through an extended Theory of Planned Behaviour model incorporating knowledge and moral norms where applicable, and (iii) the gendered dimension of access to agricultural information sources and delivery channels among cashew farmers. Based on the Random Utility Theory (RUT), the Theory of Planned Behaviour (TPB), and Social

Capital Theory (SCT), this thesis addresses the following overarching research question: what farmer, farm, household, institutional, or psychological based factors influence smallholder cashew farmers' intentions to join formal export-oriented cooperatives in Kenya and Nigeria, and how do these factors operate within each national context?

Social capital (that is, bonding and bridging) plays an important role in the farmer, farm and household factors influencing the intention of farmers to join cooperatives (Zeweld et al. 2017; Azad & Pritchard 2023). The role of social capital in the decision-making processes of social groups, particularly in rural contexts, has been documented by Hunecke et al. (2017) and Rivera et al. (2019). While bonding social capital can influence farmers' intentions by reinforcing traditional practices and sharing trusted, localised knowledge, which can enhance cooperative behaviour and mutual aid within the community (Azad & Pritchard 2023), bridging social capital can introduce farmers to new technologies, practices, and resources that they might not have encountered within their immediate community, thus influencing their intentions towards more innovative and market-oriented approaches (Cofré-Bravo et al. 2019). The type, quality, and diversity of information available within farmers' networks, including family, friends, extension services, and agricultural and non-agricultural groups, can significantly influence their intentions regarding participation in cooperatives (Muyanga & Jayne 2006; Baird et al. 2016). The increased availability of high-quality and robust information through these networks can assist farmers in addressing high transaction costs and market fragmentation (Markelova & Mwangi 2010; Cofré-Bravo et al. 2019; Azad & Pritchard 2023). Although extension services have made some progress in providing farmers with a degree of reliable farm-related information (Akinola et al. 2023; Nnawiwe et al. 2023), their overall effectiveness still suffers from underperformance due to gaps in coverage and a lack of adequate resources (Osumba et al. 2021). In the absence of formal extension services in agricultural settings, the role of informal social networks becomes increasingly important for the flow of agricultural information and knowledge.

Additionally, the delivery channels within these networks, whether formal or informal through direct, digital, or in meetings, are greatly influences on how information is perceived and used. Studies have shown that effective delivery methods can directly influence farming intentions by improving a farmer's access to timely, applicable information, which could enhance a farmer's ability to make informed choices, for instance, joining a cooperative (Churi et al. 2012; Aldosari et al. 2019; Nikam et al. 2020). According to the literature, farmers' accessibility as well as their preference for different delivery methods can be shaped by their gender (Idowu et al. 2021; Masambuka-Kanchewa et al. 2021). In many rural settings, men and women often have unequal access to delivery channels due to cultural norms, social structures, and gendered divisions of labour (Zougmore & Partey 2022). Additionally, gendered

division of labour further complicates this inequity (Zougmore & Partey 2022). Men, who typically control more resources and have greater mobility, may prefer or have access to information delivery methods such as mobile phones, digital platforms, or group meetings that connect them to broader networks, markets, and extension services (Fletschner & Mesbah 2011). These methods provide timely and relevant information that can enhance decision-making and productivity.

In contrast, women, particularly in rural and patriarchal societies, often face restrictions on their mobility and participation in public spaces, making them more reliant on local, face-to-face communication within their immediate social circles (Peterman et al. 2014; Quisumbing et al. 2014). This could pose a crucial challenge, limiting farmers' access to bonding or bridging social capital, and consequently, creating more dependence on informal networks such as family, friends, or local women's groups for agricultural information (Meinzen-Dick et al. 2014; Twyman et al. 2015; Mudege et al. 2017). As a result, women farmers may not have access to the same quality or diversity of information as men, which could negatively affect decisions made, especially concerning resource access and participation in cooperatives.

Besides the influence of social capital on agricultural decisions, the Theory of Planned Behaviour developed by Ajzen (1985) provides a practical framework for understanding the intention of farmers to join a cooperative. This theory explains that a person's intention to behave in a certain way is shaped by their attitude, subjective norm, and the perceived behavioural control (Ajzen 1991). This framework has been extended to include additional predictors like moral norms and knowledge constructs (Bagheri et al. 2019; Maleksaeidi & Keshavarz 2019) to gain more understanding into farmers' decision-making (Kaiser & Scheuthle 2003; Bondori et al. 2018). For example, the moral norm may indicate a farmer's moral obligation to join a network to support the community or a market sustainability program (Savari et al. 2023), while a farmer's profound knowledge about the functioning, benefits, and challenges of a cooperative is likely to affect their intention positively (Fielke & Bardsley 2014; Engel et al. 2017; Zamasiya et al. 2017). As opined by Arvola et al. (2008) and Karimi and Saghaleini (2021), moral norms are internalised values that shape one's ethical responsibility and are impactful factors within ethical frameworks. They are more pronounced within ethical frameworks when the decision maker, such as the farmer, feels obliged to act (Kaiser and Scheuthle 2003; Govindharaj et al. 2021). Within a context that prioritises the values of a community and the ethical norms of its frameworks, moral norms become an important factor in the community of cashew farmers. They perceive membership in a cooperative as an ethical obligation to support the community's welfare (Mutonyi 2019; Wassie et al. 2019). Factors other than instrumental financial motives, such as ethics and community integration, become apparent in the intent to join cooperatives and dedication to community values

(Craft 2013). According to several authors, knowledge also triggers behavioural intention (Adnan et al. 2018; Aldosari et al. 2019; Abad et al. 2020; Govindharaj et al. 2021). The awareness and understanding of a particular issue influence people's attitudes and decision-making (Bagheri et al. 2019). As outlined by Taherdoost (2018), knowledge is one of the five critical factors in the decision-making process, which influences the formation of more consistent attitudes. For cashew farmers in Kenya and Nigeria, understanding the benefits of cooperatives and their functioning becomes crucial, as the literature suggests that farmers with better knowledge about cooperative structures, market access, and fair pricing systems are more likely to be part of cooperatives (Fischer & Qaim 2012; Mwambi et al. 2020). However, a lack of cooperative knowledge, coupled with the historical challenges faced by farmers within cooperatives, may lead to scepticism and farmers' reluctance to join cooperatives (Nyairo et al. 2022).

Several authors have examined the factors influencing farmers' intentions to join cooperatives in Nigeria and Kenya (Awotide & Awoyemi 2015; Mbagwu 2018; Etim et al. 2021), and others have examined the effect of cooperative membership on farmers' outcomes such as their productivity, technical efficiency and welfare (Wossen et al. 2017a; Olagunju et al. 2021; Kehinde & Ogundeji 2022; Akinola et al. 2023). Yet, significant gaps exist. Studies examining the factors influencing membership in cashew cooperatives in Kenya and Nigeria using the TPB model remain scarce. Moreover, the existing literature, such as Kolade & Harpham (2014) and Awotide & Awoyemi (2015), often overlook the impact of psychological variables, such as farmers' knowledge of agricultural cooperatives or the impact of moral norms, as determinants of the intention to join. To this end, this study addresses this gap by employing the expanded TPB model to investigate the relationships among different psychological constructs influencing the intentions to join cashew cooperatives in Nigeria and Kenya. The thesis also employs the RUT to examine the impact of farmer, farm and household as well as institutional factors influencing farmers' intention to join. Lastly, using the SCT, the thesis aims to examine the gendered dimensions of information exchange, focusing on the sources and delivery channels of information among cashew farmers in Kenya and Nigeria.

The case for studying whether farmers intend to join cooperatives cannot solely rest on conceptual novelty alone. Across SSA, agricultural cooperatives remain an important instrument through which donors and governments try to improve market access and stabilise incomes for smallholders (Bernard & Spielman 2009; Fischer & Qaim 2012). Yet, the uptake of cooperative membership among farmers exposed to promotional programmes is most times uneven, and the programmes sometimes yield modest or mixed welfare effects where organisational incentives and farmer perceptions are poorly aligned with programme design (Bernard & Spielman 2009). In export oriented value chains especially regarding crops like cashew where

traceability requirements and buyers shape participation costs and benefits, weak or nonexistent cooperative participation may be a sign of more than just financial limitations. For instance, farmers' perceptions of the legitimacy of cooperatives may depend on trust in institutions, social ties that carry information, and perceived legitimacy of collective arrangements in addition to farm level economics (Narayan 1999; Woolcock & Narayan 2000). Recommendations for policy makers run the risks of repeating generic prescriptions while underlying impediments continue to exist at the community level in the absence of empirical clarification on these behavioural and relational factor that impede cooperative membership intention.

To this end, the thesis addresses that empirical gap as practically consequential in order to achieve this goal. Although Kenya and Nigeria's agricultural systems and export pressures may appear similar on the surface level, their institutional histories of cooperative formation and regulation differ, which makes learning from both contexts particularly instructive and important (Bernard & Spielman 2009; Fischer & Qaim 2012). Therefore, establishing policy relevance requires connecting our theoretical claims about cooperative membership intentions, through the lens of Random Utility Theory, the Theory of Planned Behaviour, and Social Capital Theory, to observable differences in intentions which are influenced by farmer, farm and household factors, psychological variables, and social capital patterns in communities that produce cashew. By this, the study aims to provide evidence that can guide and inform context-sensitive cooperative promotion strategies rather than just purely aspirational ones.

Understanding the ways through which collective action via cashew cooperatives can encourage the adoption of sustainable practices, improve the socioeconomic well-being of cashew farmers, and enhance the effectiveness of cashew value chains therefore becomes crucial. To this end, this study investigates specifically the factors influencing farmers' intentions to join cashew cooperatives, with a particular focus on the sources and channels of delivery of agricultural information, psychological factors, and the role of gender in this processes. This research is important because it stands to resolve the following important issues:

1. Promoting collective action and sustainability
2. Addressing socioeconomic challenges
3. Leveraging information sharing and communication
4. Exploring psychological and gender variables
5. Policy development and implementation
6. Strengthening the global cashew value chain
7. Academic and practical contributions.

While avoiding direct comparisons, this thesis is structured in a way that combines important aspects of the study to ensure coherence and complementarity between the case studies from Kenya and Nigeria. After the literature review in

Section Two and the statement of objectives in Section Three, a combined Methodology chapter (Section Four) details the shared research method, which outlines the contextual adaptations for each case study (that is, Kenya and Nigeria). The findings are reported in Section Five (Results), organised by research objectives for both case studies. The chapters for the Discussion and Conclusion are presented in Sections Six and Seven, respectively. Chapter Seven also presents the recommendations, contribution to knowledge, and the suggestions for future studies.

2. Literature Review

2.1. Introduction

This chapter describes literature on studies carried out by other researchers that are pivotal, relevant and applicable to this study. This chapter examines key theoretical frameworks and underpinnings that support this study, such as the Theory of Planned Behaviour (TPB), Random Utility Theory (RUT), and Social Capital Theory (SCT). These theories combined explain the decision-making processes of farmers and the role of social networks within producer groups. The chapter also provides the historical context of cashew production both in Kenya and Nigeria, alongside the value chain and processing activities involved. This review provides a comprehensive analysis of information sharing among farmers, its determinants, and its impact on the economic performance of smallholder farmers in Kenya and Nigeria.

It is crucial to note that the term “marketing” is used recurrently throughout this thesis, and because it carries multiple distinct meanings across the disciplines that inform this study, a definitional clarification is offered here before the substantive literature is reviewed. In the agricultural economics tradition, marketing refers to the system of activities, institutions, and processes that move agricultural produce from the farm gate to the final consumer, encompassing assembly, grading, storage, processing, transportation, pricing, and exchange (Kohls & Uhl 2002; Tomek & Kaiser 2014). This usage is structural and functional. It treats marketing as the set of value adding operations that transform raw produce into a marketable commodity within a value chain, and it predates by several decades the more familiar use of marketing as a synonym for promotional or communications activity in business management (Crawford 1997).

Within this agricultural economics sense, three related but analytically distinct constructs recur in the present thesis and warrant explicit definition. Marketing channels refer to the sequenced routes through which agricultural produce passes from producer to buyer, including any intermediaries such as brokers, traders, processors, and exporters (Kohls & Uhl 2002). Marketing costs refer to the transaction, transportation, storage, and coordination costs incurred along these channels, and they are a primary determinant of the producer’s net share of the final consumer price (Jaffee & John 1995; Tomek & Kaiser 2014). Marketing cooperatives, as established in Section 2.2.5, are producer owned collective entities whose primary function is the aggregation, grading, and joint sale of member produce into these channels, with the explicit aim of reducing marketing costs and improving the producer’s bargaining position relative to concentrated buyers (Sexton 1990; Cook 1995).

It is therefore important to distinguish this agricultural economics usage from the marketing communications sense of the term, which refers to the strategic management of advertising, branding, and consumer engagement activities by a firm. Although delivery channels feature prominently in this thesis, particularly in relation to information exchange about cooperative membership, the term marketing is used throughout in its agricultural economics sense unless explicitly qualified. Where reference is made to communication or information dissemination, the terms communication or information are used instead. This distinction is preserved consistently in the chapters that follow.

2.2. Context of the Study

2.2.1. Overview of Cashew Tree and its Importance

Cashew trees first grew naturally in northeastern Brazil. Portuguese traders carried the plant to Goa, on India's west coast, sometime between 1563 and 1570 (Kluczkovski & Martins 2015). From there, the tree spread along the western side of India, and by the 1800s, it had reached other parts of Asia and many countries in Africa (Duguma et al. 2021). Today, cashews are farmed in about thirty-two tropical nations that sit between 25 degrees north and 25 degrees south of the equator, mainly in low, coastal areas (Stefan 2021).

In the wild, a cashew tree can reach about 14 metres, but farmers usually keep orchard trees shorter, usually around 9 to 12 metres, so that their wide, six- to eight-metre crowns get plenty of sun and are easy to harvest (Kluczkovski & Martins 2015). The species thrives where yearly rainfall tops one metre and where daytime temperatures stay between roughly 19 °C and 35 °C, averaging about 25 °C (Duguma et al. 2021). Although it can handle heat as high as 45 °C, the tree suffers in cold or frosty weather (Kumar et al. 2012). It also needs at least six hours of sunlight each day to stay healthy (Kumar et al. 2012).

Cashew fruit gives two main products: the apple and the nut. Seed-grown cashews begin to set fruit after three or four years, while grafted plants can do so in their second year (Hammed et al. 2008). A fully grown tree yields roughly seven to twelve kilograms of nuts annually and can keep producing for five or six decades (Muniu et al. 2019). Each nut hangs at the end of a bright yellow or red "cashew apple," which is actually the swollen flower stalk. Once the nut is taken from the ripe fruit, it is split into a kernel and a shell. Crushing the shell releases cashew-nut-shell liquid (CNSL), an oily substance rich in phenols that is widely used to make paints and similar products. From one batch of raw nuts, processors usually obtain about 20–24 per cent kernel and roughly 20 per cent CNSL, both of which are sold on the world market. The apple, on the other hand, is sweet, juicy, and quick to spoil, so people

either eat it fresh or turn it into juice, squash, or alcoholic drinks. Unfortunately, in many growing regions, these apples are still thrown away because facilities for storage and processing are limited (Oluyole & Abbas 2016; Stefan 2021).

The edible kernel sits inside the hard nut but is covered by a thin skin called the testa. This skin contains tannin and other bitter compounds that keep pests away from the valuable kernel. According to Hedge (2022), almost every part of the cashew tree has a commercial use. Kernels themselves are loaded with fat (about 46 per cent), protein (about 18 per cent), useful minerals such as calcium, phosphorus, and iron, and plenty of the healthy unsaturated fat linoleic acid. People eat them plain or add them to sweets and baked goods.

According to research by Hedge (2022), the different parts of the cashew tree used are illustrated in Figure 1 below:

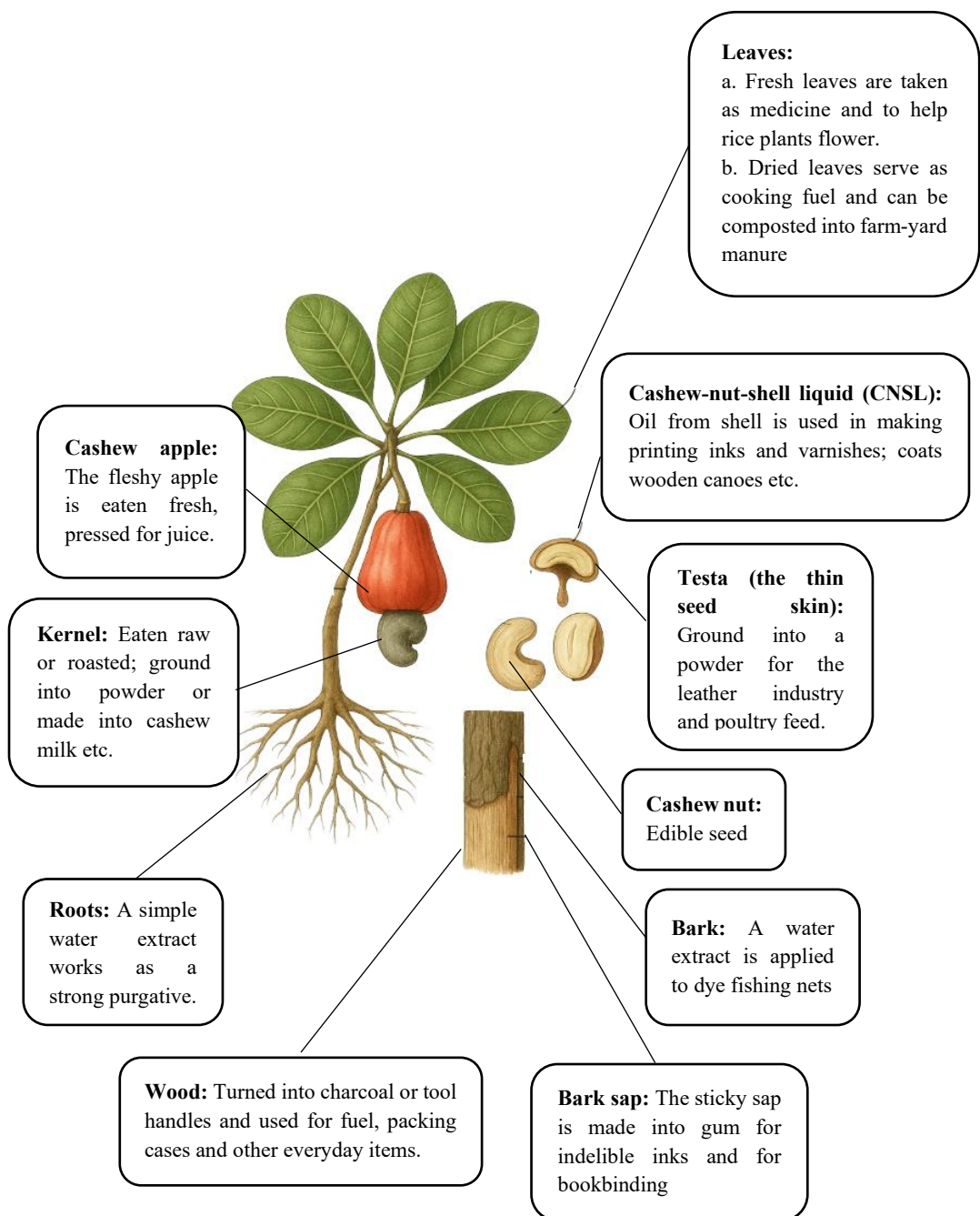


Figure 1. Cashew tree uses

According to Karthickumar et al. (2014), one hundred millilitres of cashew juice supplies roughly 262 mg of vitamin C, five times more than the same amount of orange juice, plus good levels of calcium and iron (see Table 1).

Table 1. Nutritive values of cashew kernel and cashew apple

Constituents	Kernel (%)	Apple (%)
Moisture	6.90	87.90
Protein	21.00	0.20
Fat	47.00	0.10
Carbohydrates	22.00	11.60
Fibre	1.30	0.90
Minerals	2.40	0.20
Phosphorus	0.45	0.01
Calcium	0.55	0.01
Iron (mg/100 gm)	5.00	0.20
Carotene (I.U/100 gm)	100.00	-
Vitamin B1 (mg/100 gm)	630.00	-
Riboflavin (mg/100 gm)	190.00	0.50
Vitamin C (mg/100 gm)	-	170.00 – 350.00

Source: Karthickumar et al. (2014)

In India and some parts of SSA, traditional medicine makes wide use of the tree (Karthickumar et al. 2014; Ogunwolu et al. 2020). Bark, leaves, and gum are chewed for sore teeth and gums; a bark paste treats ringworm; boiled roots act as a laxative. Leaf fibres are given for calcium lack and stomach cramps. The wood stands up to water, so people fashion it into boats, oars, and farm tools. Its resin can soothe coughs and drive away (Karthickumar et al. 2014). Leaf infusions also serve as remedies for certain sexually transmitted infections. Recent work shows that seed extracts help muscle cells absorb blood sugar, easing insulin resistance in diabetes. The nuts themselves hold antioxidants such as phenols and vitamin C, while bark, stem, and leaf extracts are recommended for stomach problems, impotence, leishmaniasis, swollen glands, and general swelling and pain (Karthickumar et al. 2014).

Industrially, CNSL obtained from roasting or boiling the nuts can reach up to 25 per cent of the shell's weight. This dark, thick oil turns up in fuels, lubricants, varnishes, brake fluids, clutch linings, fungicides, insecticides, glues, and lacquers, highlighting just how versatile the cashew tree really is.

2.2.2. Cashew Production in Africa

According to the data from FAOSTAT (2024) period-averages, Africa's cashew industry has expanded spectacularly since the 1960s as a result of post-independent policies promoting cashew as a non-traditional export, competitive advantages in rain-fed yields and global rising demand for raw nuts from Asian processors (Stefan 2021). Output was once scattered and small-scale. Nigeria (approximately 20,000 t/yr), Mozambique (approximately 140,000 t/yr) and Tanzania (approximately 78,000 t/yr) were the only countries topping a few tens of thousands of tonnes in 1961-1970. By 2021-2023, however, the Ivory Coast had surged past the one-million-tonne mark, while Benin (approximately 190,000 t) and Burkina Faso (approximately 140,000 t) joined Tanzania (approximately 213,000 t) in the second tier. Other West African producers such as Guinea-Bissau, Ghana, Mali and Mozambique now each average 100,000 t/yr or close to it, reflecting the region's dominant share in the modern trade. Even countries that still report modest volumes, such as Senegal and Togo, show steady decade-on-decade gains. This figure below (Figure 2) highlight a clear shift of global raw-nut supply towards West and East Africa, with the Ivory Coast, Benin and Burkina Faso rising from minor players to major exporters in little more than a generation.

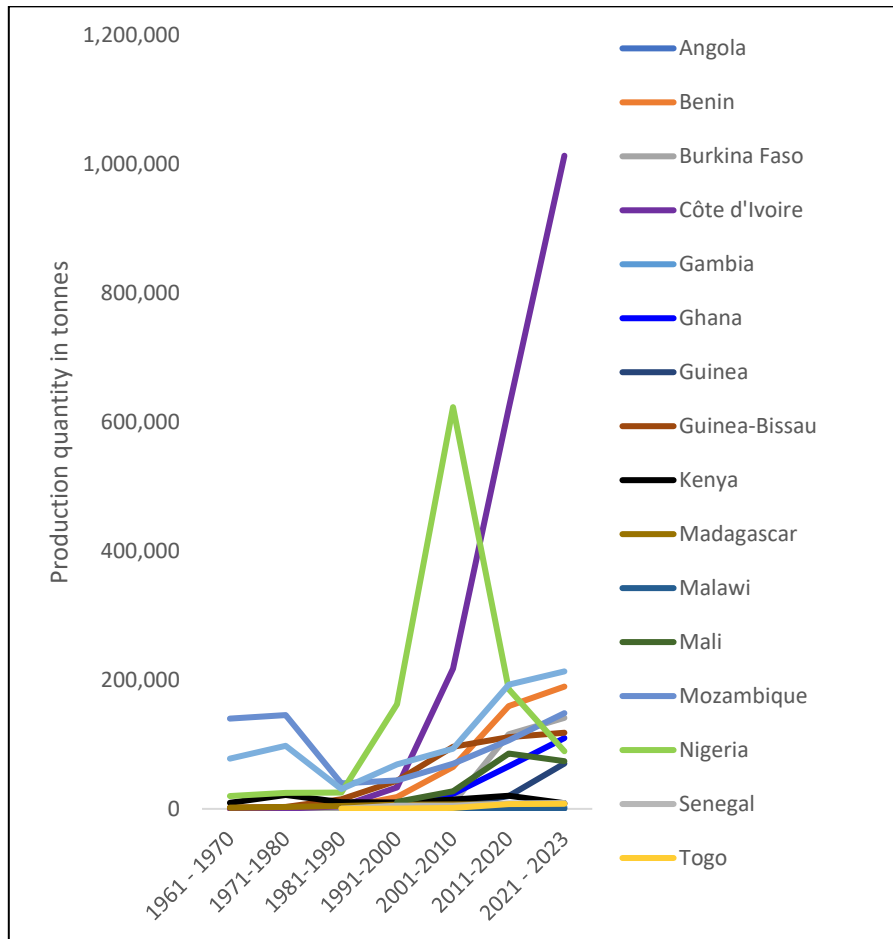


Figure 2. Chart showing the trend of cashew nut production in Africa.
Source: FAOSTAT (2024)

As shown in Figure 3Figure 2 below, Mozambique dominated African cashew production, contributing 71% of continental output due to investment from Portuguese colonialists in coastal plantations and processing infrastructure. However, the competitive collapse began after 1975, when nationalisation policies dismantled private farms, further compounded by the devastating civil war which occurred between 1977 and 1992. This civil war led to the destruction of orchards and export corridors (Antonio & Griffith 2017; World Bank 2022). Concurrently, Côte d'Ivoire emerged as the cashew leader in Africa through strategic state-market partnerships after 1990. At first, market liberalisation attracted private investment in high-yield seedling distribution. Then, port modernisation in Abidjan/San-Pédro enabled cost-efficient raw nut exports to Asian processors. Furthermore, the 2013 National Cashew Development Strategy integrated smallholders into global value chains through cooperatives and price guarantees (Miet Maertens, Swinnen 2015; Kolliesuah et al.

2020). By 2023, Côte d'Ivoire produced 58% of Africa's cashews, a 2,600-fold increase since the 1960s, while Mozambique's share fell to 8%, demonstrating how policy consistency and infrastructure enabled West Africa's 'cashew boom' amid traditional producers' decline (Kolliesuah et al. 2020; World Bank 2022).

2.2.3. Cashew Production in Kenya

2.2.3.1. History and Decline of Cashew Production in Kenya

Cashew cultivation was established over five centuries ago along the coastal regions of Kenya. This represents the country's oldest commercial cash crop, mainly concentrated in Kwale, Kilifi, Malindi, and Lamu counties (Shisanya & Khayesi 2007). While small-scale commercial processing began in the 1930s, a significant portion of the raw nut harvest continued to be exported due to insufficient local processing capacity (Mwangi et al. 2013). A significant shift happened in 1975 with the establishment of Kenya Cashew Limited's modern Kilifi plant, which became operational by 1976 and was capable of processing 15,000 tonnes annually. According to Mwangi et al. (2013), the establishment of the processing plant failed to sustain the industry due to challenges like price disincentives, ageing trees beyond their productive life period, and poor crop management. In addition, adverse weather conditions, which affected the flowering of cashew trees, as well as limited investment in research activities, all contributed to the decline in production around the 1970s and 1980s (Morang'a 2023). These issues all led to widespread neglect of trees and plummeting yields. The areas under cashew cultivation reduced from 36,000 hectares in the late 1980s to just 27,000 hectares by 2006. Ultimately, the Kilifi plant closed in 1998, leaving only small-scale processors active, and most raw nuts were again exported until a government ban on raw nut exports was imposed in 2009 to stimulate local processing and value addition (Mwangi et al. 2013).

Nonetheless, its strong economic function, employing income and labour for more than 70,000 small-scale farmers and adding to foreign exchange earnings, Kenya's cashew industry has endured a sharp decline (Shisanya & Khayesi 2007; KNBS 2021). Production dropped from 18,907 tonnes in 2015 to 11,404 tonnes in 2016, and the area under production decreased from 28,758 to 21,284 hectares (Ojwang et al. 2017; Awazi & Quandt 2021; FAOSTAT 2024). That decline is due to disease epidemics, the old age of the trees, lack of attention by farmers, failure to produce charcoal or other cash crops, climatic variations leading to extreme weather to minimise yields and escalate poverty, and increased insecurity along the coast (Mwangi et al. 2013; Anthony 2021). Other key constraints are the lack of proper infrastructure to process cashew and being constrained to market through brokers and making mostly raw export shipments, and the absence of market information to the

detriment of farmers (Shisanya & Khayesi 2007; Farm Africa 2022). For these reasons, production now stands annually at around 8,000-10,000 tonnes (see Figure 3), way below the past highs of 36,000 tonnes back in the 1970s/80s and the country’s potential of 200,000 tonnes (KNBS 2021).

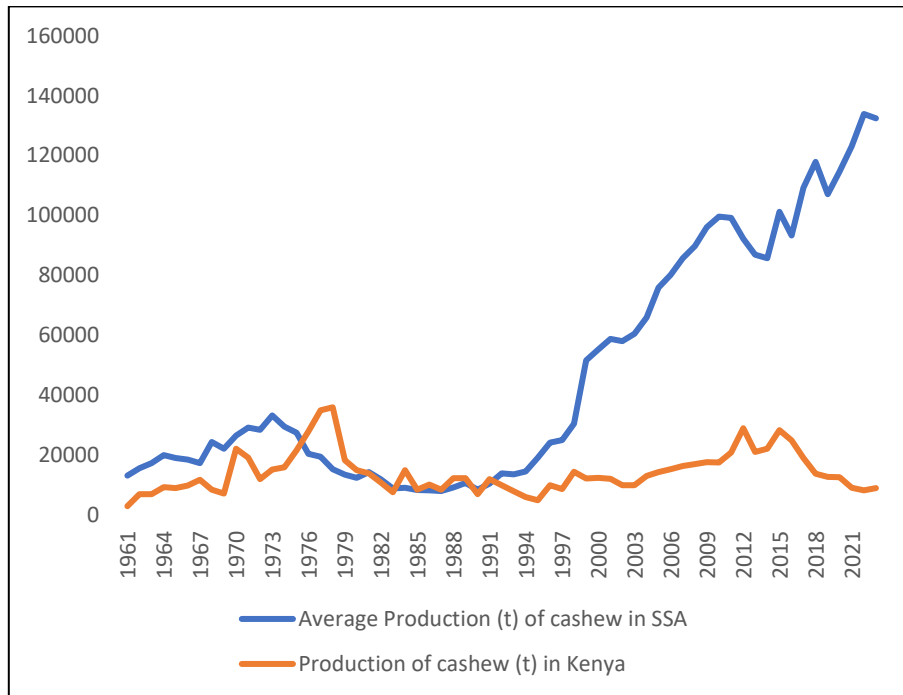


Figure 3. Cashew nut production in Kenya vs. SSA average (1961–2023) (FAOSTAT (2024))

Moreover, data from FAOSTAT (2024) shows marked inequalities in cashew nut production (in shell) between Kenya and the regional average of Sub-Saharan Africa (SSA) between 1961 and 2023 (see Figure 3). The aggregated production across SSA shows a strong upward trend, which is influenced by leading producers such as Côte d’Ivoire, Nigeria, and Tanzania. While these top producers benefited from favourable conditions, government and donor investments, cashew production in Kenya declined (Duguma et al. 2021; FAOSTAT 2024). The historical background of Kenya’s agricultural institutions, particularly the Cooperative Unions, is attributed to this production decline (Wanyama 2008, 2009). These secondary umbrella organisations, which were established in 1965, played a crucial role in unifying smallholder farmers and overseeing the production and marketing of essential cash crops like cashews, initially displacing private traders through a state-sanctioned monopolistic framework (Wanyama 2008, 2009). At their zenith, Cooperative Unions accounted for as much as 60% of agricultural output, centralising the processes of

buying and selling, indeed, unauthorised purchasing or transportation of produce was deemed illegal without Union permits (Wanyama 2009). However, the deregulation of agricultural markets in the 1990s proved detrimental to this system (Hussi et al. 1993; Porvali 1993). Deprived of their state-enforced monopoly and rendered incapable of competing with frequently unregulated local brokers, the Cooperative Unions ultimately collapsed (Wanyama 2009). Beyond the organisational problems, this failure involved widespread asset depletion where processing equipment and cooperative funds were either stolen or misappropriated. This destroyed crucial infrastructure, permanently undermining farmer confidence in cooperative ventures (Wanyama 2009; Marion 2022).

Moreover, the mismanagement and eventual privatisation of Kenya Cashew Nut Limited in the year 1993, following its closure in 1998, significantly affected farmers who used the firm to make ends meet through the years (Ojiambo 2002). The liberalisation process has subjected the farmers to the market defined by the volatility of prices; hence, they have, to an extent, neglected the trees and the crop. This is due to the limitation on credit that hampers the purchase of vital crop supplies and input supplies to manage pests and diseases (UNCTAD 2002). Also, pests and diseases represent some challenges to the production of cashews. Among the diseases most common to infest cashews are anthracnose and powdery mildew, and the most prominent pests are cored bugs, cashew nut bugs, cashew bark borers, and cashew stem girdlers (Ojiambo 2002; Waithaka 2002; Koech et al. 2016). Currently, powdery mildew is the leading disease to infest cashews within the production zones around Lamu, Kilifi, and Kwale within the ecological zones around Coast Province. Furthermore, cashew nut farmers also face shortages of advisory or financing assistance and limited access to facilities to facilitate research and the distribution of extension services.

Consequently, Kenya's cashew production fell short of the regional average. This shows the impact of institutional breakdown rather than simple fluctuations (FAOSTAT 2024). Although policies like the Agricultural Sector Development Strategy (2010–2020) as well as increased private sector participation in the value chain have been put in place, Kenya still struggles to reach regional benchmarks as a result of deep-seated structural problems that are directly related to historical failures (Ruto 2010; Koech et al. 2016; Anthony 2021). These issues include the ongoing fragmentation of smallholder systems, a persistent and deep-seated distrust of cooperatives caused by theft and failure after liberalization, a lack of processing infrastructure (partly due to the union assets taken apart), and the growing climate change effects, like irregular rainfall patterns and droughts that affect coastal areas (Wanyama 2009; Mwangi et al. 2013; Morang'a 2023).

2.2.3.2. Local Cashew Product Chain and Main Stakeholders in Kenya

The deep institutional failure and the long-standing problems within the cashew sector in Kenya have principally defined its modern-day value chain and led to an underperforming and disjointed system (Amare et al. 2024). The cashew value chain within the Coastal Province is underdeveloped, with its disjointed structure and lack of leading actors along the value chain to regulate and facilitate the complete chain themselves (Farm Africa 2022). Relatively few farmers commercially produce cashews, and a limited number of farmers sell their output to available processing plants. Large quantities of the cashew crop are not harvested and continue to indicate the lack of organisation within the marketplace (Amare et al. 2024). Informal ties between farmers and processors mainly comprise the cashew trade, with many transactions mediated through middlemen, i.e., local agents or brokers. Middlemen facilitate the transaction, but the contacts are on the basis of irregular, ad hoc personal contacts and not formalised ones (Figure 4), an observation validated through the 2018 baseline study, revealing 100% dominance by smallholder farmers with limited processor linkages (Hejkrlik et al. 2018).

The absence of written contracts or formal agreements along the value chain makes it difficult to establish unclear trading terms, including quality and price standards (Amare et al. 2024). Without these organised long-term commitments, the value chain is encouraged to be inefficient, and the exchange of knowledge and new technological advances that could enhance market structure and productivity is limited (van Rijsbergen et al. 2016). Consequently, due to its highly informal nature, the cashew value chain is unable to escape stagnation and has little potential to modernise.

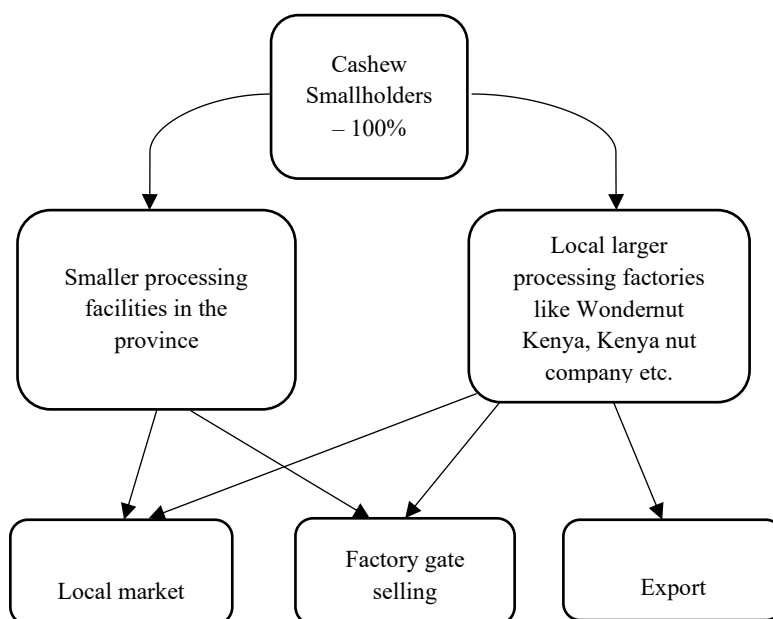


Figure 4. Local cashew value chain from baseline study in Kenya.

Source: Hejkrlik et al. (2018)

2.2.3.3. Production and Processing of Cashew by Producers in Kenya

A baseline survey carried out in Kenyan coastal region prior to the data collection period, in collaboration with other colleagues from the Faculty of Tropical AgriSciences, suggests that smallholders, especially women farmers, collect cashews from the ground and load them in jute sacks to small and mid-size trucks, which the middlemen organise (Hejkrlik et al. 2018; Ingutia & Sumelius 2022). The cashew apples are thrown away to rot without any use in the field. Most respondents sell their cashews to brokers; only a small minority sell them directly to the market (Hejkrlik et al. 2018). The main harvesting of the raw cashew nuts is done for 8 – 10 weeks, mainly between October and February. Therefore, there is a need to purchase the entire crop from farmers within 12 weeks and store it in the warehouse for over 12 months for processing throughout the year before the new harvest. Interviews carried out with brokers revealed that the actors in the cashew subsector have inadequate working capital to purchase and store the entire crop (Hejkrlik et al. 2018).

Furthermore, there are several smaller and larger processing sites in the provinces. Middlemen usually own smaller processing sites (small cottage industries). They utilise elementary hand tools with limited processing capacity. Only a few nuts are steamed and peeled for the local market in these facilities. An example of a local

broker (middleman) during our interview was Teso Cashew Nut Store and Processors, which trades 1000 tonnes/year. The owner uses a network of 30 agent-buyers who operate in all the coastal provinces from Kwale to Lamu. They receive a commission for each kg of nuts. They have no system of control of quality (or different pricing mechanisms), and some grading is done after the nuts are brought to the main store. The company then supplies all the major processors around. They sell processed raw kernels for 800 – 1000 KES/ kg. The company also operates a small processing unit.

Processing is done by extracting kernels from the shells through splitting (shelling). The shelling is done traditionally or through industrial processing in a few larger facilities. However, all more extensive facilities operate below production capacity, limiting distribution and exports. Our team could only visit those facilities for a little detailed information.

2.2.4. Cashew Production in Nigeria

2.2.4.1. History and Decline of Production in Nigeria

Cashew was introduced to Nigeria by Portuguese traders in the 16th century (Ohler 1979). The crop was used at the time to combat erosion and support afforestation projects in the now-defunct Eastern Nigeria (Hammed et al. 2008). The first commercial cashew planting in Nigeria occurred in the mid-1950s, and these plantations were planted with Indian cashew varieties that had been introduced. During that period, the cashew industry experienced poor progress as a result of the plantations' general neglect and inadequate management (Adeigbe et al. 2015).

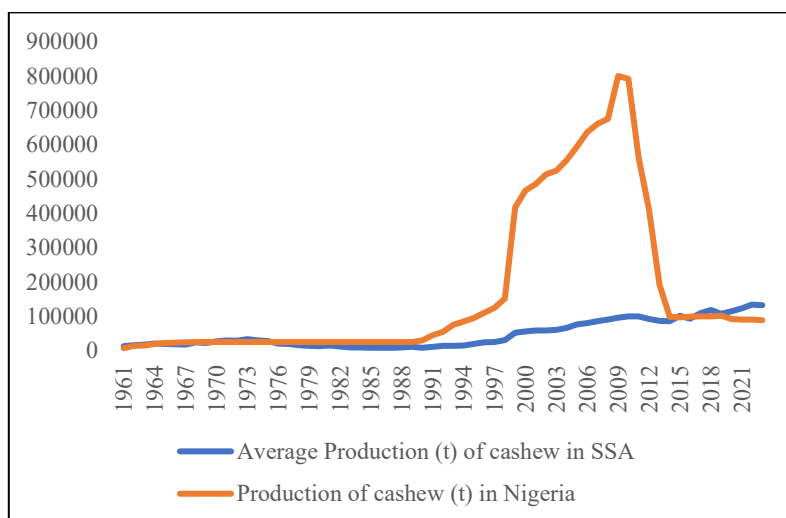


Figure 5. Cashew nut production in Nigeria vs. SSA average (1961–2023)
Source: FAOSTAT (2024)

Although cashew is cultivated throughout Nigeria, it is primarily located in the southern and middle belt regions, where it is produced on smallholder farms and plantations. From the 1960s until the early 1990s, cashew production remained at approximately 25,000 tons with an estimated 50,000 hectares of land as at 1990 (Adeigbe et al. 2015). Additionally, from 1980 up until 2017, Nigeria produced approximately 255.28 thousand tonnes of cashews yearly. This amount merely makes about 10% of the average production worldwide (Olukunle 2022). Figure 5 shows the trend of cashew production in Nigeria compared to the SSA production average. Data from FAOSTAT (2024) shows Nigeria's position and role in SSA's cashew nut production (in shell) between 1961 and 2023. Although the SSA regional average shows consistent growth, Nigeria's production path has always surpassed this standard since the mid-1980s. This positioned the nation as a regional leader alongside the Ivory Coast. This disparity, reaching its peak around 2009/10 because of major government and private sector efforts enhancing production and export (Adeigbe et al. 2015), showcases Nigeria's comparative benefits in cashew farming, which include vast appropriate agro-ecological areas in states such as Enugu, Oyo, and Kogi, along with gradual growth in processing capacity led by the private sector (Adeigbe et al. 2015; Kolliesuah et al. 2020). The surge in cashew production in Nigeria after the early 2000s aligns with the federal government's prioritisation of activities other than oil exports under the APP (2016–2020). Under this policy, farmers were provided with improved seedlings and export incentives. However, data shows that Nigeria is yet to fully capitalise on its potential in terms of production, as yield gaps remain high compared to the global average across cashew-producing countries. This yield gap is attributed to ongoing issues in smallholders' productivity, post-harvest losses, which

are estimated at around 20-30%, and a lack of proper integration in the value chain (Adeigbe et al. 2015; Oluyole & Abbas 2016; Eze et al. 2023).

Despite the large and growing domestic and regional market for surplus kernels, as well as other cashew by-products, Nigeria faces several challenges to improving its cashew production and processing. Some of these include: old trees, high input costs, pests and diseases, poor quality of produce, infrastructural constraints, low yield varieties, the prevalence of small holdings and wild varieties, land acquisition, unfavourable climatic conditions, diseases and pests, post-harvest losses, the prevailing market price of the product and the competition amongst the local buying agents, and a lack of enabling environment characterized by insufficient stimulating policies and respective measures (Olife et al. 2013; Adeigbe et al. 2015).

2.2.4.2. Local Product Chain and Its Main Stakeholders in Nigeria

The stages of the cashew value chain in Nigeria are shown in Table 2, which also describes the agents involved in the chain from production via various marketing and processing channels to the market (end consumers). It also highlights the function of each agent and their expected outputs. Specialised institutions, such as the Cocoa Research Institute of Nigeria and the National Association of Cashew Nigeria, play important roles as agents in the value chain, especially in terms of providing needed technical expertise, market linkages, and quality control (Eze et al. 2023). These agents altogether enhance the overall chain functionality and sustainability.

Table 2. Stages and key agents of the Nigerian cashew nut value chain

S/N	Stage of the chain	Agent	Value addition	Output
1	Input supply	Credit providers, Cocoa Research Institute of Nigeria (cashew researchers), Agrochemical companies' representatives	Marketing, Supply, and Transportation	Inputs delivery, training and support services to farmers.
2	On-farm production	Farmers, research institutes, and other stakeholders (University)	Establishment, maintenance, management, harvesting and selling	Cashew nuts and cashew apple
3	Post-harvest handling	Farmers, research institutes and other stakeholders (University)	Primary processing (3-day drying)	Dry cashew nut (low moisture content)
4	Post-management intermediate trade	ACA, Licensed buying agents, local buying agent, National Association of Cashew Nigeria	Marketing and Transportation	Graded and sorted cashew nuts to be exported in good condition
5	Product transformation	Cashew nut processing firms	Processing	Roasted Cashew and CNSL
6	Export trade	NEPC, SMEDAN, SMEs, export firms, and cashew processing firms	Export	Cashew nuts
7	Consumption	Buyers and consumers (end-users)	Consumption	Cashew nut products and by-products.

Source: Adesanya et al. (2021)

2.2.4.3. Production and Processing of Cashew by Producers

There is only one production season for cashews in Nigeria. Cashew trees commence flowering in November and end in December, with fruiting commencing in February (Hammed et al. 2008). Late February is when harvesting begins, and it lasts until late May or early June. After two to four years of gestation, the trees begin to yield fruit. Productivity begins to rise from the fifth year, and optimum production occurs after ten years of planting. The cashew tree bears fruit for 25 to 30 years, with a significant decline in output after 30 years. Owing to its extended gestation time, cashew production is seen as an investment with a long payback (Adeigbe et al. 2015).

Cashew is often propagated by seed planting on pre-prepared plots during peak rainfall seasons. In normal circumstances, cashew seeds may survive for a maximum of twelve months. Once grown, the fruits with nuts attached fall to the ground and are manually collected. The fruit separates from the nut after it has been harvested. Cashew nuts are dried for 3-5 days before being sold in bowls or calabashes at local marketplaces and shopping centres. Drier climates improve nut quality and reduce the risk of mould during storage and shipment (Eze et al. 2023).

The primary processing step is the extraction of the kernel from the shell. Raw cashew nuts have 50% shell, 20-25% CSNL, and 25-30% kernel (Sornprom 2007).

Producers and processors can diversify their sources of revenue and add value by processing cashew nut products and by-products (Adesanya et al. 2021).

2.2.5. Foundations of Cooperative Theory and the Cooperative Movement

Any meaningful discussion of cooperative organisation in SSA must rest on a clear understanding of exactly why cooperatives exist as an organisational form, what distinguishes them from other firms, and what the cooperative movement has historically aspired to achieve. The cooperative model is not a residual or transitional institution. It has its own intellectual lineage, its own normative commitments, and a body of theory that explains why farmers, consumers, and workers have repeatedly chosen this organisational vehicle over investor-owned alternatives. This subsection therefore traces the historical roots of the cooperative movement, sets out the core theoretical perspectives that explain the existence and persistence of cooperatives, and connects these foundations to the analytical focus of this thesis.

2.2.5.1. Historical foundations of the cooperative movement

The modern cooperative movement is conventionally traced to the establishment of the Rochdale Society of Equitable Pioneers in Lancashire, England, in 1844 (Holyoake 1893; Birchall 1997). Faced with exploitative pricing and adulterated goods in the post-Industrial Revolution market, twenty-eight weavers and skilled workers pooled modest savings to open a member owned consumer store, governed by a written set of operating principles that emphasised open membership, democratic control, limited return on capital, and surplus distribution proportionate to use rather than to investment. These principles, refined over the following century, were codified by the International Cooperative Alliance into what are now widely known as the seven Cooperative Principles (ICA 2015). Together, these principles do more than just describe internal governance. They constitute the normative identity of the cooperative as an organisational form, distinguishing it from the investor-owned firm, the state enterprise, and the informal mutual aid association. The historical persistence of the cooperative movement across diverse political and economic systems, from European consumer societies and Scandinavian agricultural cooperatives to Indian dairy federations and East African coffee unions, suggests that the form addresses recurring structural problems in markets that purely investor-owned firms have not been able to resolve (Birchall 1997; Develtere et al. 2008).

2.2.5.2. Theoretical approaches to the existence of cooperatives

If the cooperative movement provides the normative foundation, theory provides the analytical justification. Several streams of scholars explain why cooperatives emerge and survive, and three of these are particularly relevant for the present study.

The first is the transaction cost perspective. Drawing on Williamson (1979, 1985), Staatz (1987) and Cook (1995) argue that cooperatives arise as a response to market failures that raise the costs of transacting through arm's length markets, particularly in settings characterised by asset specificity, small numbers bargaining, and information asymmetry. For smallholder agricultural producers, who individually face concentrated buyers, perishable produce, and high search and negotiation costs, vertical integration through a producer owned cooperative reduces these transaction costs by internalising the marketing function within the producer collective. The cooperative becomes, in this account, a mechanism for safeguarding producer interests in transactions where the alternative is structural exposure to opportunistic behaviour by intermediaries.

The second is the collective action perspective, grounded in Olson (1965) and substantially developed by (Ostrom 1990). Olson's foundational insight, that rational individuals will not voluntarily contribute to the provision of a collective good unless selective incentives or small group conditions are present, established the analytical puzzle that cooperative theory has grappled with ever since: *why do farmers join cooperatives at all, given the temptation to free ride on the marketing services that other members provide?* Ostrom's subsequent work on commons governance demonstrated that durable cooperative institutions emerge where members are able to design rules, monitor compliance, and impose graduated sanctions in ways that align individual incentives with collective outcomes. The collective action lens is particularly important for the present study because it locates the decision to join a cooperative within a calculus that combines individual rationality, social embeddedness, and institutional design, rather than treating membership as a purely economic transaction.

The third is the market structure perspective, which addresses the specific case of marketing cooperatives. Sexton (1990) and Sexton & Iskow (1988) demonstrate analytically that producer marketing cooperatives can act as a competitive yardstick in oligopsonistic markets, where a small number of large buyers exercise market power over many dispersed producers. By aggregating supply, negotiating collectively, and providing a credible alternative outlet, marketing cooperatives shift the bargaining frontier in producers' favour and discipline the pricing behaviour of investor-owned buyers. This perspective is directly relevant to export oriented cashew

value chains in SSA, where farmers typically face a small number of licensed buyers, processors, or exporters, and where the marketing cooperative therefore performs both an economic and a structural role in the value chain (Bernard & Spielman 2009; Fischer & Qaim 2012).

These three theoretical streams are complementary rather than competing. Transaction cost theory explains why the cooperative form exists as an organisational solution to market failure. Collective action theory explains why and under what conditions individuals choose to participate. Market structure theory explains why the marketing cooperative in particular is a defensible response to concentrated buyer power. Together, these three provide the analytical foundation for treating cooperative membership as a behaviour worth explaining in its own right, as well as studying the determinants of that behaviour with the rigour that the present thesis attempts.

These literature provides three commitments that shape the rest of the thesis. Firstly, cooperatives are treated here as an institutionally distinctive organisational form with their own normative and theoretical identity, not as informal groupings or generic farmer associations. Secondly, the decision to join a cooperative is understood as embedded simultaneously in economic logic (such as transaction costs, market structure) and in social and institutional logic (collective action, governance, trust), which justifies the multi-theoretical framework adopted in Chapter 3 (Research Methods). Thirdly, the focus on marketing cooperatives within export-oriented value chains is theoretically grounded in the market structure perspective, as it is precisely in oligopsonistic export channels that the marketing cooperative performs its most analytically distinctive role. With this in mind, the thesis now shifts to the empirical record of cooperative societies in SSA, and the institutional environments of Kenya and Nigeria in which cashew farmers operate.

2.2.6. Cooperative Societies in Sub-Saharan Africa

Before delving into the regional context, it is useful to define what is meant by “cooperative” in this thesis, as the term carries several overlapping meanings in the literature. According to ICA (1995), cooperatives are described as “*an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise*”. According to ICA (1995), cooperatives are guided by the following principles:

1. Voluntary and open membership
2. Democratic member control
3. Member economic participation
4. Autonomy and independence
5. Education, training and information
6. Cooperation among cooperatives, and

7. Concern for community

Within this umbrella, agricultural cooperatives have historically taken several functional forms, including credit and savings cooperatives, input supply cooperatives, processing cooperatives, service cooperatives, and marketing cooperatives, with each of these addressing a different dimension of the collective action problem faced by smallholder farmers (Cook 1995; Bijman & Iliopoulos 2014). The term “producer cooperative” or “producer organisations” is being widely used in development policy and donor literature as a categorical descriptor that incorporates these functional types, particularly when the focus is on farmer-owned organisations engaged in commercial agriculture (Bernard & Spielman 2009; Lutz & Tadesse 2017; Ofolsha et al. 2022).

This thesis operates within the broader categorical understanding, while focusing analytically on marketing cooperatives. A marketing cooperative is defined here as a producer-owned collective whose primary function is the aggregation, grading, and collective sale of member output, typically into formal value chains and, in this study, into export-oriented value chains (Bernard et al. 2008; Wollni & Fischer 2015; Möllers et al. 2018). This narrowing down is deliberate and intention and reflects three considerations. Firstly, in cashew-producing communities across Kenya and Nigeria, the principal collective action challenge is not the provision of credit or processing capacity, but stable access to export buyers and downstream traceability requirements (Bernard & Spielman 2009; Fischer & Qaim 2012). Secondly, the theories used in this thesis (that is, Random Utility Theory and the extended Theory of Planned Behaviour) are designed to explain a single clearly defined behavioural target, and joining different types of cooperatives reflects different motivations and trade-offs that cannot be modelled coherently within one estimation framework. Thirdly, this thesis adopts a multiple (distinct) case study design in which Kenya and Nigeria are examined as independent cases of the same phenomenon, and a defining requirement of the case study method is a clearly specified unit of analysis that is consistent across cases (Yin 2018). Holding cooperative type constant as the marketing cooperative within each case study preserves this analytical consistency.

Based on this narrative, marketing cooperatives play a critical role in agricultural development by facilitating capital formation, creating employment, and strengthening market power (Ortmann & King 2007a). They help reduce the negative impacts of inefficient markets by facilitating contractual connections to input and output markets and by fostering economic cooperation in liberalised markets, which may be used to support market functions for smallholder farmers (Fischer & Qaim 2012). Collective marketing in output markets enables small-scale farmers to share the fixed expenses of marketing, improve their capacity to negotiate higher prices and increase their market power (Markelova & Mwangi 2010). It also allows contractual

arrangements between major buyers and small producers, which would otherwise be too expensive for such buyers to negotiate, monitor, and enforce contracts with many dispersed individual farmers (Shiferaw et al. 2011).

Generally, cooperatives in Sub-Saharan Africa have existed since the pre-colonial period. However, they are now of various types and structures and have evolved along distinct pathways. The colonial government founded agricultural cooperatives to facilitate collective action. For instance, in Kenya, The *Lumbwa* Cooperative Society was founded in 1908 by European farmers to purchase seeds, chemicals, fertilisers, and other farm inputs collectively and market their produce collectively to benefit from economies of scale; on the other hand, the first cooperative in Uganda was a growers' association founded in 1913 (Poole & Frece 2010).

These societies can range from informal groupings to formal groups or cooperatively owned agri-businesses. Cooperatives, associations, and societies are organisational designs that may be found in many countries, depending on their projected roles and legal restrictions. A farmer association is a non-profit organisation that uses group action to get certain services (such as agricultural extension), facilitate information sharing, and provide members representation and a voice. Farmer cooperatives, conversely, can engage in commercial operations, such as the collective sale of output and the acquisition of commercial inputs. Economic benefits are frequently granted to members after covering costs based on the number of transactions conducted through collective action. Unlike other alternative agro-enterprises, farmers frequently prefer this type of organisation since it can qualify the group for tax exemption or additional public or donor funding. Furthermore, farmer groups may engage in a variety of endeavours and serve a variety of purposes. This may include:

1. Commodity-specific commercial organisations (for example, coffee, tea, or cocoa cooperatives),
2. Advocacy organisations that aim to represent the interests of their members in various policy discussions (for example, national farmer unions),
3. Development organisations that aim to improve local capacity and access to information and technology, and
4. Multipurpose organisations that engage in various economic, social development, and empowerment activities (Shiferaw et al. 2011).

Cooperatives in SSA are also perceived as a strategy employed by the national governments to improve efficiency by disseminating new technologies to farmers, identifying shared goals, and devising new strategies (Fischer & Qaim 2012). This often involves supporting existing farmer groups to meet the conditions necessary for formal cooperative formation, providing a structured pathway for scaling up collective action (Ingutia & Sumelius 2022).

Cooperative societies in Sub-Saharan Africa (SSA) are characterised by diverse structures, encompassing both formal and informal organisations. Formal cooperatives are typically registered entities governed by legal frameworks such as Kenya's Cooperative Societies Act No. 12 of 1997 (amended 2004) and Nigeria's federal Cooperative Societies Act (Cap. 98, Laws of the Federation of Nigeria, 1993; amended 2004), which define membership, governance, and operational policies (FAO 2020). These cooperatives often receive external support, including government programs, donor funding, and technical assistance, which enable them to scale and access broader markets. In contrast, informal cooperatives, often rooted in local community practices, are more flexible but may struggle with resource mobilisation and sustainability (Park et al. 2021). Export-oriented cooperatives have become critical in linking farmers to global markets, particularly in value chains such as coffee, cocoa, and cashews (Baüml et al. 2022). These cooperatives facilitate market access by aggregating smallholder produce and negotiating better prices on behalf of their members. They also provide farmers with access to credit, training, and technical support (Abate et al. 2014; Abdul-Rahaman & Abdulai 2020).

2.2.7. Economic Importance of Marketing Cooperatives in Export-Oriented Value Chains

Export crops such as cashew, coffee, cocoa, and cotton dominate SSA's agricultural exports, and marketing cooperatives play a vital role in aggregating volumes, maintaining quality standards, and coordinating processes to meet export requirements (Barrett 2008). This type of cooperatives not only provide market access but also channel essential services such as input provision, credit access, extension services, and certification for quality assurance which is key to accessing export markets (Bińkowski 2014; Kehinde & Kehinde 2020). For instance, in Ghana and Ethiopia, cooperatives have significantly increased farmers' returns through better price negotiations and by facilitating access to certification schemes such as Fairtrade and organic labels (Francesconi & Heerink 2011; Abebaw & Haile 2013).

Furthermore, cooperative membership correlates strongly with higher productivity and incomes. Empirical evidence from Rwanda and Ethiopia suggests that farmers in cooperatives earn significantly higher profits due to enhanced access to information, inputs, and markets (Bernard & Spielman 2009; Verhofstadt & Maertens 2014; Mojo et al. 2017). These organisations also foster economies of scale in marketing, allowing members to bypass exploitative middlemen and access premium markets (Altman 2015). Also, cooperatives often act as a channel for government and donor interventions, enabling the efficient delivery of capacity-building programs, rural financing schemes, and infrastructure development (Minah & Malvido Pérez Carletti 2019; Abdul-Rahaman & Abdulai 2020).

Below are some of the roles of cooperatives in facilitating access to premium markets:

- 1. Market Aggregation and Economies of Scale:** One of the primary roles of cooperatives is aggregating produce from numerous small-scale farmers, thereby achieving volumes necessary to meet the quantity demands of premium buyers. Many export-oriented markets, including those for cashew, cocoa, and coffee, require consistency in supply, both in quality and quantity. Individually, farmers cannot meet such volumes, but cooperatives enable bulk transactions that reduce per-unit marketing costs and attract high-value buyers (Barham & Chitemi 2009). For example, in Kenya's coffee and horticulture sectors, cooperatives have played instrumental roles in mobilising thousands of farmers to comply with Global G.A.P. certification standards, thereby gaining entry into European markets (Fischer & Qaim 2012). Similarly, in Nigeria's cashew sector, cooperatives are used by exporters to secure traceable, quality-assured nuts from members with better post-harvest handling practices (Mojo et al. 2017).
- 2. Quality Control and Compliance with Standards:** Premium markets are often regulated by sanitary, phytosanitary, and sustainability standards. Meeting these standards requires investments in knowledge, technology, and compliance. Cooperatives provide platforms for training farmers in quality control, proper post-harvest handling, sorting, and grading. In Ethiopia, cooperative membership significantly improves farmers' knowledge of quality requirements, increasing their likelihood of receiving quality premiums. In addition, cooperatives also work with certification bodies to coordinate audits, distribute compliance costs among members, and enforce collective standards. This is particularly visible in organic and Fairtrade certification schemes, which are almost exclusively accessible through cooperatives (Shaw et al. 2015; Francesconi & Wouterse 2022).
- 3. Enhancing Bargaining Power and Price Negotiation:** Individually, farmers have minimal bargaining power and are often at the mercy of middlemen who offer prices below market value. Cooperatives mitigate this asymmetry by engaging in collective bargaining, negotiating directly with exporters, and sometimes entering into forward contracts or long-term supply arrangements with reputable buyers (Bernard & Spielman 2009; Verhofstadt & Maertens 2014). Cooperatives are equipped with knowledge of market trends and quality assessment tools, which ensure that members receive prices that reflect the actual value of their output. In Rwanda, coffee cooperatives have enabled farmers to move from selling red cherries to processing and selling washed coffee, significantly increasing their returns through value addition and better price negotiation (Shiferaw et al. 2011).

- 4. Facilitating Access to Information and Market Intelligence:** Premium markets require current and dynamic information regarding trends, prices, buyer requirements, and certification updates. Cooperatives serve as a channel for this information through partnerships with NGOs, government agencies, and private buyers. This role reduces the information gap that traditionally sidelines farmers from modern markets (Adeogun et al. 2010). Similarly, cooperatives help in diffusing innovation and market intelligence in Mali, where women and marginalised farmers particularly benefited from cooperative-led information access (Beaman & Dillon 2018). In the context of Nigerian cashew farmers, cooperatives linked to platforms like the NCAN have facilitated access to export market specifications and buyer linkages.
- 5. Access to Financial Services and Market Readiness:** Cooperatives also facilitate access to financial services like input credit, advance payments, and group insurance schemes. These services are critical for preparing produce to meet premium standards. Because premium markets typically delay payments until delivery and quality verification, cooperatives may provide bridging finance or negotiate advance payments with exporters, cushioning their members from liquidity constraints (Barrett 2008). Also, cooperatives often serve as credit guarantors. Financial institutions consider cooperatives more creditworthy than individuals due to their governance structures, traceability, and collateralization capacity. In Kenya, Savings and Credit Cooperative Organisations (SACCOs) and agricultural marketing cooperatives have used their collective reputation to attract microfinance institutions and development bank loans to fund harvest and post-harvest processes (Mathuva 2016).
- 6. Trust and Long-Term Buyer Relationships:** Premium markets prioritise not only quality and volume but also consistency, traceability, and ethical sourcing. Cooperatives act as reliable intermediaries that assure traceability and enforce contract compliance. Their governance mechanisms often include sanctions for defaulters and member education. This improves buyers' confidence in long-term engagement, which is essential for stable incomes. In SSA, including Nigeria and Kenya, long-term contracts with European buyers have only been feasible through cooperatives and organised farmer groups, especially in cashew and coffee farming (Putnam 2000).
- 7. Training and Capacity Building:** Cooperatives also bridge the knowledge gap by offering training on best practices, market trends, and quality standards. This support helps farmers improve their productivity and product quality, which are crucial for competing in international markets (Mashavave et al. 2013; Ortega et al. 2019). For instance, cooperatives train farmers in

crop management, pest control, and post-harvest handling, ensuring that products meet the specifications required by exporters and global buyers.

8. Logistical Support and Market Linkages: By organising collective transport, storage, and marketing, cooperatives streamline logistics, reducing transportation costs and inefficiencies. They also facilitate the market by negotiating contracts with exporters, processors, and retail chains, ensuring that farmers' products reach international markets at favourable prices, linking them to premium markets such as Europe (Poole & Donovan 2014; Ogutu & Qaim 2019).

2.3. Challenges of Agricultural Cooperatives in SSA

While the several potential benefits of agricultural cooperatives for smallholder farmers are well-documented in the literature, the reality of these groups across much of SSA is that many cooperatives struggle to function effectively and sustain themselves over time. A significant number of these cooperatives only exist on paper or face liquidation problems, which highlights a critical gap between the theoretical potential and practical performance of agri-cooperatives in SSA (Francesconi et al. 2023). Understanding these challenges is crucial to explaining why farmer participation rates can be low and why the positive image of cooperatives is often tarnished.

Many cooperatives were created during the era of colonial masters not to empower the local farmers, but to streamline the production and export of agricultural commodities for the benefit of colonial powers (Francesconi et al. 2023). However, after independence, these cooperatives were often converted into government parastatals, becoming channels for subsidies from the government and political patronage rather than being member-driven businesses. This history created a long-lasting perception of cooperatives as avenues and instruments of the state, leading to a lack of genuine ownership among their members (Wanyama 2008). Across several countries in SSA, this has resulted in a deep-seated distrust of the cooperative model itself, a sentiment which is also echoed in Central Europe due to its communist-era associations.

A second, fundamental challenge is the structural and operational weakness within the cooperatives. Unlike their commercial counterparts in Europe and North America, many SSA cooperatives are composed of semi-subsistent farmers with very small landholdings. Due to rapid population growth and inheritance patterns, farmland is highly fragmented (Francesconi & Wouterse 2022). This means members produce a small marketable surplus, which disincentivises the cooperative from investing in large-scale aggregation and commercialisation. Instead, many become multipurpose

entities, diluting their resources and managerial capacity across too many services, from input supply to social functions, which undermines their economic competitiveness (Tadesse et al. 2018).

This leads to the critical problem of missing managerial capital. Many cooperatives lack the professional management and business acumen needed to run a successful enterprise. Data gathered from over 500 cooperatives across six SSA countries suggests that the annual income realised per member is often less than \$1 per day, where a limited number of cooperatives use the services of a professional manager with a meaningful salary (Francesconi et al. 2023). This lack of business orientation prevents cooperatives from offering competitive prices and reliable services to their members.

Closely related are internal governance issues such as a lack of trust, transparency, and elite capture. Studies consistently show that mistrust among members and towards leadership is a significant barrier to participation. According to Uchezuba et al. (2016), in Namibia, farmers cited a lack of transparency and the perception that their interests would not be protected as key reasons for not joining cooperatives, with the overall probability of a farmer joining being only 29.5%. Furthermore, the flow of external aid and subsidies, while well-intentioned, can sometimes be captured by cooperative leaders, a problem known as elite capture, which further erodes member trust and commitment (Platteau 2007; Francesconi & Wouterse 2015).

This creates a vicious cycle of financial constraints and member disloyalty. Restricted access to credit facilities and financial services often hinders cooperatives from investing in better infrastructure, processing equipment, and storage facilities (Levai et al. 2024). Therefore, when cooperatives are unable to offer clear economic benefit to their members, they often engage in “side-selling” (selling their produce directly to private traders outside the cooperative, especially when offered immediate cash payments). This behaviour severely undermines the cooperative’s volume and financial stability, making it even harder to deliver benefits (Bernard et al. 2008).

Finally, many cooperatives suffer from a dependency syndrome. They are often established by and remain dependent on external support from NGOs or government programs. When this support terminates, these cooperatives frequently collapse because they have not developed sustainable, member-funded business models (Francesconi & Wouterse 2015). This over-reliance also shows that the governance models imposed are often “off-the-shelf” blueprints from developed countries that are ill-suited to the context of fragmented, smallholder agriculture in SSA (Francesconi & Wouterse 2022).

2.4. Sustaining Cooperatives and Farmer Membership: Successful Models in SSA

Despite the significant challenges faced within cooperatives, some models and approaches in SSA have shown greater capacity for sustainability and success. These models address cooperative inherent issues, especially concerning poor management and a lack of member loyalty, by creating clear economic benefits and effective governance structures within such groups. These successful examples provide a clear blueprint for strengthening collective action among smallholder farmers.

One practical and effective approach is the development of specialised, commodity-specific cooperatives. Unlike multipurpose cooperatives, which spread resources too thin, these organisations focus on a single high-value commodity, such as coffee, cashew, cocoa, dairy, or horticulture. By specialising, a cooperative can develop deep expertise, build a strong brand, and establish efficient marketing channels. A study in Ethiopia has confirmed that cooperatives focusing on a limited range of services for committed members are more competitive in the marketplace (Tadesse et al. 2018). For instance, coffee cooperatives in Ethiopia and cocoa cooperatives in Ghana have historically generated more income and employment compared to multipurpose cooperatives (Abate 2018; Francesconi et al. 2023). This focus reduces the “free-rider” issues, as membership is most attractive to those who are seriously engaged in that specific value chain, leading to a more committed and homogeneous membership base.

This professionalisation of management is also a critical factor when focusing on sustainability. Successful cooperatives often invest in hiring skilled, paid managers. This introduces the crucial managerial capital into such farmer groups where hired professionals can handle complex business tasks like contract negotiations, ensuring financial transparency, and implementing business plans, tasks that are often beyond the capacity of a volunteer member committee. According to Francesconi et al. (2023), in their research that observed over 550 cooperative groups in Kenya, the study revealed that the presence of paid managers in the cooperative system acted as a key differentiator, which resulted in the transformation of the cooperatives into job-creating enterprises. This professional management builds trust among members by leading to better business outcomes, thus reducing perceptions of corruption or incompetence when members see their cooperative being run as a competent business. This increases the confidence and willingness of members to participate actively within such groups.

Additionally, integrating digital technologies and improving access to finance are powerful sustaining factors, as studied by Ciruela-Lorenzo et al. (2020), Choruma et al. (2024) and Onah et al. (2024). Cooperatives now utilise mobile platforms to

disseminate information like market prices, deliver extension advice, and facilitate fast and reliable mobile payments to farmers. This transparency and efficiency strengthen the cooperative's value proposition to its members, thus making the cooperative a vital tool to improve the livelihood of farmers. Also, access to finance, whether through internal savings schemes or partnerships with formal financial institutions such as microfinance institutions, enables cooperatives to provide essential services to their members. A study conducted by Uchezuba et al. (2016) in Namibia found that timely access to agricultural credit within the cooperative significantly increases the probability of a farmer joining cooperatives. Hence, the ability of cooperatives to provide inputs on credit or offer timely cash payments for produce ensures effective competition with informal traders, significantly reducing the urge of members to engage in side-selling. This translates to members viewing the cooperative as a viable market channel for selling their produce.

Furthermore, while the role of supportive external partners (for instance, extension agents) is crucial, the type and nature of the support provided is equally as important. Research carried out by Magakwe & Olorunfemi (2024) highlights the important role that supportive external partners play in promoting and sustaining collective marketing initiatives among smallholder farmers in SSA. The findings indicate that agricultural extension officers play an important role in this ecosystem by directly improving smallholder farmers' awareness of collective action through the sharing of knowledge and information. Cooperatives display better resilience and an expanded capacity to create quality, market-standard commodities in regions where extension services are active and accessible, such as some parts of Kenya and Ethiopia, thanks to the necessary information provided on production and resources provided (Abate et al. 2014; Nyairo et al. 2022). On the other hand, the study by Magakwe & Olorunfemi (2024) also identified that a lack of extension outreach, as observed in South Africa and other similar contexts, correlates strongly with cooperative failure, often stemming from a deficit in group management knowledge and unmanageable internal conflicts. Aside from the role of public extension services, the study also shows the significant contributions of NGOs and government programmes, which provide essential resources, capital, and training for cooperative members. This crucial external support does not only facilitate access to production inputs and credit but also empowers smallholder farmers with the needed leadership and management skills, which helps to build the institutional capacity necessary for collective businesses to thrive. However, the effectiveness of these external partners can be hampered by poor policy structures, dependency, and inadequate implementation, which often fail to prioritise resource-poor smallholder farmers. Instead of creating dependency on such policies and programmes, adequate support could empower the cooperative to function independently rather than making it a passive channel for aid.

A strong emphasis on member education and inclusive governance is crucial for sustaining cooperatives, as it directly builds the managerial capital and trust necessary for long-term success. According to Francesconi et al. (2023), continuous education of cooperative members is essential to help them understand their rights, the cooperative's business model, and the long-term benefits of collective action, which empowers them to hold leaders accountable, thus preventing elite capture. This opinion is echoed by other studies, such as those by Uchezuba et al. (2016), who found that a lack of transparency and trust was a primary deterrent to membership. Magakwe & Olorunfemi (2024) were also of the opinion that cooperatives thrive where extension services provide ongoing training. Furthermore, inclusive governance that actively involves the often neglected (such as women and youth farmers) through specific employment programs and leadership roles, as seen in successful Kenyan cases (Francesconi et al. 2023), would ensure the cooperative is representative and taps into a broader talent pool.

The strategy of using "Trust Ambassadors", who are trusted community members capable of explaining cooperative benefits, is supported by evidence from across SSA as an effective means of influencing farmer behaviour, such as participation in cooperatives. In Ethiopia, the government and NGOs have long utilised "model farmers", individuals with high social standing and proven agricultural success, to disseminate new technologies and practices (Nyambo & Ligate 2013; Samson Olayemi et al. 2021). These studies have shown that these model farmers who embody trusted local knowledge are far more effective at influencing adoption decisions among peers than external extension agents, precisely because they leverage pre-existing bonding social capital and subjective norms within rural communities (Spielman et al. 2011; Nyambo & Ligate 2013; Samson Olayemi et al. 2021). Similarly, a study which assessed the effectiveness of volunteer farmer trainers in promoting the adoption of agricultural technologies in Western Kenya revealed that farmer trainers played important roles in mobilising and training fellow farmers (Lukuyu et al. 2012). The approach proved sustainable with trainers continuing the work years after the initial project ended. The continuation was largely driven by non-financial incentives such as improved social status and leadership roles within the community. These trainers were most effective in disseminating relatively simple farm technologies, as these were easier to communicate and demonstrate. This model leveraged respected local farmers to disseminate knowledge, making it a validated method for low-cost, sustainable extension in smallholder settings (Lukuyu et al. 2012).

2.5. Dynamics of Agricultural Co-operatives in Kenya and Nigeria: Trust Issues and Operational Status

Despite growing evidence that cooperatives may help farmers access information and technology and improve markets (Cheyo et al. 2024), success is not always guaranteed for today's farmer groups in the SSA, primarily due to several overlapping challenges. Today's cooperatives face several internal and external challenges that might hinder their ability to compete more successfully or offer desired services to members at low prices, in addition to the unsuccessful previous attempts that continue to cast a shadow over future directions (Ezekiel 2023).

In Kenya, Co-operative Unions are secondary umbrella organisations formed to handle the produce of small farmers (Wanyama 2009). These unions, formed in 1965, were established to manage the production and marketing of various agricultural products, such as cashews, copra, maize, cassava, and others, from small-scale farmers (Wanyama 2008, 2009). These Unions often took over roles traditionally held by private local traders through state control and monopolistic practices, controlling up to 60% of all production (Baka 2011). For instance, the baseline survey carried out in 2018 revealed that buying produce without Union authorisation was once illegal, and the transportation of produce required permits signed by the Union (Hejkrlik et al. 2018). These Unions also invested in properties, factories, and other ventures. However, the collapse of the cashew sector came quickly with liberal policies of 90-ies, with the union losing its state-enforced monopolistic position and being instantly overcome by more efficient competition from smaller local brokers (Wanyama 2009).

Baseline survey revealed that the Union still has about 15,000 formally registered members in Kilifi and owns significant land where Wondernut company processors operate with strong links to the Co-operative Bank (shares and involvement in the board (Hejkrlik et al. 2018). It also maintains an internal governing structure of nine members in the management committee, elected for two years, and three members in the supervision committee. The general assembly consists of 45 members. There is an entry fee of 200 KES¹ (approximately 1.55 USD), and one share costs 1000 KES (approximately 7.75 USD) (Hejkrlik et al. 2018). The annual fee for co-operative members is 5000 KES (approximately 38.76 USD) (Hejkrlik et al. 2018). However, the whole structure is still somewhat dormant. Most of these societies have yet to organise any general assembly meetings for the last 25 years. Without incentives in the form of working capital, support from the government, improvement of

¹ As of June 2024, 1 USD is equivalent to 129.00 KES.

management and governance capacities, and trust of farmers, any serious activity will not be able to be restarted.

As of June 19, 2020, Kenya had 25,050 registered co-operatives, with agriculture accounting for 24.5% (1,295) of this total (ICA-Africa 2021). However, it is essential to note that nearly 79% (19,788) of registered co-operatives currently find themselves dormant or have undergone liquidation (ICA-Africa 2021). In contrast, the remaining 21%, constituting 5,262 active co-operative societies, remain operational in the various counties (ICA-Africa 2021). Within this active group, approximately 58% (3,052) of these societies are dedicated to saving and credit endeavours (ICA-Africa 2021). Interestingly, a smaller fraction of the active co-operatives, about 24% (1,272), is comprised of agricultural co-operative societies engaging in a diverse array of activities, including but not limited to coffee, tea, beekeeping, fishing, and more (ICA-Africa 2021).

The willingness and reluctance of farmers in coastal Kenya to engage with producer or marketing groups often stems from a lack of trust, attributed to governance failures (mismanagement, fund diversion), operational weaknesses (infrastructure gaps, obsolete tech), financial precarity (high-interest loans, climate debts), and social exclusion – all systemic barriers documented in Kenya’s cooperative sector (Kamau 2019; ICA-Africa 2021). One of these critical contributors is past negative experiences, where farmers have been deceived or taken advantage of by previous groups, leading to a hesitancy to participate in another group (Miroro et al. 2023). Furthermore, the issue of corruption also acts as a constraint, as some producer groups may have exhibited corrupt practices, with leaders misappropriating group resources for personal gain, eroding trust and diminishing farmers’ preference to join (Miroro et al. 2023). Additionally, a lack of transparency and accountability within producer and marketing groups can compound the problem, making it challenging for members to believe that the group is acting in their best interests and further undermining trust (Kamau 2019).

On the other hand, Nigeria’s agricultural co-operatives also face significant hurdles, including poor governance, inadequate funding, and weak infrastructure (Kehinde et al. 2025). Unlike Kenya, where co-operatives once held state-backed monopolies, Nigeria’s co-operative sector has struggled with fragmentation and inconsistent government support (Kehinde et al. 2025). Many Nigerian co-operatives suffer from elite capture, where influential members control resources at the expense of smallholder farmers. A study by Ezekiel (2023) found that co-operative leaders often divert loans meant for farming inputs to personal use, discouraging member participation. Additionally, a lack of access to credit limits co-operatives’ ability to invest in modern farming techniques (Akinola et al. 2023).

Furthermore, the regulatory environment is another challenge. While Kenya has a well-established Co-operative Societies Act, Chapter 490 and the SACCO

Societies Act of 2008, Nigeria's co-operative laws vary by state, creating inconsistencies in governance and accountability (ICA 2019). Some co-operatives operate informally, avoiding registration due to bureaucratic difficulties (Osiki 2020).

Despite these issues, successful cases exist. The Ogun State Cooperative Federation (OGSCOFED) serves as a pivotal federated association coordinating several agricultural cooperatives across Ogun State, a key agricultural region in Nigeria's southwest, demonstrating resilience despite systemic challenges (Oduyoye et al. 2013). Operating as an integrated unit under a federated model, OGSCOFED leverages collective strength to enhance market access and operational efficiency for its constituent societies, which include cassava farming groups (OGSCOFED 2025). This structure facilitates critical interventions like training workshops, seminars, and interactive sessions designed to improve business practices, financial management, and value chain integration among smallholder farmers (OGSCOFED 2025). Substantial government support underscores this model's significance; in 2011, the Ogun State government disbursed ₦25 million (16,667 USD²) in low-interest loans (7%) through OGSCOFED, explicitly recognising cooperatives' "multiplier effect" on socio-economic development and job creation while pledging continued partnership throughout the administration's tenure (Oduyoye et al. 2013). Current initiatives documented on OGSCOFED's portal further emphasise agricultural capacity building, including entrepreneurship programs, warehouse receipt systems to reduce post-harvest losses, and targeted inclusion of youth and women in cooperative-driven agribusiness models (OGSCOFED 2025).

Agricultural cooperatives under OGSCOFED's umbrella, such as cassava-focused societies, exemplify successful collective action by pooling resources to negotiate better prices with large-scale processors and institutional buyers, thereby reducing exploitative middlemen and increasing farmer incomes (OGSCOFED 2025). While earlier studies noted persistent challenges like inconsistent policy support and governance issues impacting business failure rates among member societies between 2005 and 2010 (Oduyoye et al. 2013), OGSCOFED has continuously refined its support framework. This includes intensifying training on financial literacy, business planning, and loan recovery strategies to address transparency concerns and strengthen cooperative governance (OGSCOFED 2025). The federation actively links farmers with government programs like the Anchor Borrowers' Programme and facilitates access to improved inputs and processing technologies, enhancing productivity and value addition for commodities like cassava (OGSCOFED 2025).

The OGSCOFED's experience underscores the potential of agricultural co-operatives to improve livelihoods in Nigeria, provided critical gaps in governance, infrastructure, and policy stability are addressed.

² As of June 2024, 1 USD is equivalent to ₦1,500.00.

2.6. Information Access and Cooperative Membership Intentions: Influential Factors for Farmers

Farmers' decision to join agricultural cooperatives centres on their awareness of institutional benefits (Abdul-Rahaman & Abdulai 2020), yet uneven information landscapes create asymmetric access to this knowledge (Ullah et al. 2022). While cooperatives offer a potential gateway for risk mitigation and market entry (Zhong et al. 2022), farm and household characteristics, such as education level, asset ownership, and institutional factors, may act as filters determining who accesses credible information about cooperative value dispositions (Avila et al. 2025). This section focuses on information access and how other farm and household variables shape cooperative membership intentions, positioning information quality as a gatekeeper to intention to join cooperatives.

A recurring source of confusion in agricultural information research is the distinction between two related but conceptually separate dimensions: the source of agricultural information and the channel through which it is communicated. An information (or advisory) source (or provider) typically refers to the individual, institution, or actor from whom a farmer obtains agricultural knowledge, for example, a neighbouring farmer, a public extension officer, an input dealer, or a cooperative official (Anderson & Feder 2007; Ragasa et al. 2013). A communication channel (or delivery channel), by contrast, refers to the medium or mode through which that knowledge is transmitted, whether face-to-face conversation, a telephone call, a formal training session, a farmer field day, or a radio programme (Rogers 2003). These two dimensions frequently overlap in practice where a farmer may receive information from an extension officer (source/provider) through a farm visit (channel), or may learn from a fellow farmer (source/provider) via a WhatsApp message (channel). However, they are analytically distinct as the credibility and relevance of information are often tied to the source (or provider) from which it comes while its accessibility and reach are often shaped by the channel used (Aker 2011; Rodriguez et al. 2015). In the context of cooperative membership decisions, both dimensions matter independently. The agricultural information source that a farmer trusts as an information provider shapes whether they find cooperative-related messages credible while the channels through which they have access to determine whether those messages reach them at all (Nlerum et al. 2012; Mwenda et al. 2023). This section, therefore, examines information access and cooperative membership intentions by considering both dimensions separately, recognising that the source and the channel together determine not only what farmers know about cooperatives, but how confident and motivated they feel to act on that knowledge.

2.6.1. Information Access and Quality among Smallholder Farmers

While cooperatives hold significant potential to drive economic gains through market access and collective bargaining (Abdul-Rahaman & Abdulai 2020), farmers' decision to join centres on accessible, high-quality information about these benefits, which shapes their perceptions of usefulness, thereby driving adoption (Awuor & Rambim 2022; Koutsouris & Zarokosta 2022). According to Oadini (2014), timely access to information aids farmers in making critical decisions about farming practices and institutional participation. While interpersonal networks (friends, family, neighbouring farmers) dominate smallholder information sources, access to quality information significantly boosts productivity and market engagement (Azad & Pritchard 2023). Farmers with access to credible information have a better chance of developing and expanding their produce than those without (Magesa 2014). According to Ofori et al. (2019) and Abdul-Rahaman & Abdulai (2020), awareness of cooperative benefits, such as market access or training, directly shapes farmers' decisions to join these institutions, making access to this information as gateway to livelihood improvements. In a study carried out by van Campenhout (2021) to investigate how information provision influences the adoption of agricultural technologies and production outcomes among rice farmers in East Africa, the authors found that information interventions delivered via tablet videos triggered significant peer spillovers. Farmers living near recipients of return-on-investment (RI) training adopted technologies 6.9% more frequently due to neighbour discussions. Similar proximity-driven spillovers occurred for technical knowledge videos, boosting practices like row planting by 3-6.4% (van Campenhout 2021).

Smallholder farmers face multilayered structural barriers that critically constrain both access to and quality of agricultural information. For instance, farmers' geographic location, inadequate telecommunications infrastructure, and intermittent electricity disproportionately limit digital information channels (for example, mobile apps, online platforms) in rural communities, where 70% of Sub-Saharan Africa's farmers reside (Nagar et al. 2021; Mwenda et al. 2023). This digital marginalisation bolsters reliance on fragmented interpersonal networks, such as family members and neighbouring farmers, that often propagate outdated or contextually irrelevant knowledge (Tengapoe et al. 2024). Compounding this, language diversity and low literacy rates, averaging 64% among Nigerian smallholders, hinder comprehension of technical agricultural guidance, even when physically accessible (Akinola et al. 2023). Critically, information intermediaries, such as extension services and cooperatives, remain chronically under-resourced; in Nigeria's cashew belt, one extension agent serves approximately 2,500 farmers, severely restricting personalised advisory capacity (Hamisu et al. 2017). Subsequently, farmers experience asymmetric information ecosystems: urban-proximate growers access real-time market pricing via

SMS services, while remote smallholders depend on traders' subjective price claims, a disparity directly suppressing farmgate incomes by 15, 30% (van Campenhout 2021). These systemic gaps transform information from a productivity catalyst into a barrier, particularly for women and elderly farmers less integrated into digital or cooperative networks (Beaman & Dillon 2018; Idowu et al. 2021).

2.6.2. Farm and Household Determinants of Cooperative Membership Intention

Aside from the role that information access plays in influencing farmers' decisions to join agricultural cooperatives, literature consistently identifies a set of farm and household factors such as age, gender, education, length of residence in the community and farmers' main source of income that shape farmers' cooperative membership intentions.

The age of the farmer could influence cooperative membership intention through divergent generational priorities. For instance, younger farmers demonstrate 23% higher membership likelihood, perceiving cooperatives as platforms for technology access (for example, mobile-based market apps) and entrepreneurial networking (Mojo et al. 2017). Their openness to innovation aligns with collective bargaining for export contracts, reducing individual market-search costs by 30% (Ahado et al. 2021). Conversely, older farmers exhibit cautious affiliation, valuing cooperatives primarily for social capital and risk-pooling rather than commercial expansion (Fischer & Qaim 2012). While they contribute traditional knowledge on cashew management, their resistance to formal record-keeping and digital payment systems creates operational friction (Fischer & Qaim 2012). Additionally, longer community residency among older farmers increases their social capital, significantly shaping cooperative membership intentions through established networks and influence.

Gender disparities in cooperative membership intentions reflect rooted sociocultural barriers. Male farmers show 40% higher membership rates, primarily due to land title ownership (sometimes required for cooperative membership) and unrestricted mobility for meetings (Meier zu Selhausen 2016; Chukwujekwu et al. 2021). Conversely, female farmers face systemic exclusion: despite providing more than 60% of cashew harvesting labour, less than 20% hold leadership roles due to patriarchal bylaws requiring spousal consent for membership (Fischer & Qaim 2012). Landless women experience triple exclusion: more than 80% of agri-cooperatives in SSA mandate land collateral for loans (Christian et al. 2024), while childcare duties limit meeting attendance (Chukwujekwu et al. 2021; Olumba & Alimba 2022).

Education is also another determinant that could influence farmers' intention in cooperative affiliation through cognitive and informational pathways. Farmers with

more years of formal education, usually farmers who have attained more than primary education, show 35% higher membership odds, as literacy enables comprehension of complex bylaws, financial statements, and export certification requirements (Fadoyin et al. 2015; Mojo et al. 2017). Each additional schooling year correlates with 11% greater awareness of cooperative price premiums, facilitating cost-benefit analysis of collective action (Rehman et al. 2013). Conversely, illiterate farmers frequently misinterpret profit-sharing mechanisms, perceiving cooperatives as exploitative; only 28% accurately distinguish membership fees from trader advances (Zhao 2007). Digital literacy further expands effects: educated farmers utilise WhatsApp groups for real-time price negotiations, capturing 22% higher margins than non-members (Nagar et al. 2021).

Land ownership, a proxy for farmers' wealth status, could also influence cooperative intention. Title deed holders exhibit higher membership probability, leveraging plots as collateral for cooperative loans at reasonable interest rates versus higher market rates (c et al. 2017). Secure tenure also enables long-term investments: titled farmers invest more in cooperative-certified organic cashew production, anticipating longer-term ROI (MoALF 2019). Conversely, leaseholders/communal land users face exclusion where cooperatives require land titles for membership, while tenancy uncertainty discourages multi-year commitments (Fischer & Qaim 2012). Additionally, farmers with larger orchards exhibit greater intention to join cooperatives as fixed costs (certification, logistics) become viable through collective action: pooling harvests reduces export fees (Mojo et al. 2017). These farmers could also benefit from cooperative bulk input procurement, lowering fertiliser costs (Engel et al. 2017). Conversely, smallholders could face structural exclusion where they fail to afford membership fees, while fragmented harvests fail to meet minimum volumes for premium buyers (Verhees et al. 2015; Cheyo et al. 2024). Labour dynamics could also further compound this, where smallholders rely on family labour, missing cooperative mechanisation gains, while larger farms hire workers for timely harvesting aligned with collective schedules (Mojo et al. 2017; Xu et al. 2021).

Extension services play a huge role in bridging information asymmetries that inhibit cooperative intentions among farmers. Farmers with frequent agricultural advisor contact show higher membership intention, as agents demystify governance structures and document success cases like Kenyan cashew cooperatives securing price premiums (Rehman et al. 2013). Each extension visit increases awareness of cooperative loan programs, for instance, enabling risk-calibrated decisions (Fadoyin et al. 2015).

2.6.3. Gendered Preferences in Agricultural Information Exchange

Building on the farm and household determinants of cooperative membership intentions, literature further suggests that the gender of a farmer fundamentally shapes how farmers access, exchange, and leverage agricultural information, both in terms of whom they turn to for information and how that information is communicated (Ragasa et al. 2013; Mudege et al. 2017).

Across SSA, literature shows that women farmers rely predominantly on informal and interpersonal sources for agricultural information, such as friends, family members, and fellow farmers (Nlerum et al. 2012). Word-of-mouth and local peer networks are consistently preferred, largely due to trust, cultural familiarity, and physical proximity (Amaechi & Ossai-Onah 2015). The preference for these sources of information is not simply a matter of habit or convenience. They reflect a deeper structural realities about women farmers such as limited mobility, restricted access to formal agricultural institutions and sociocultural norms that define which spaces and networks women are expected to participate in (Meinzen-Dick et al. 2014). In settings where the movement of women outside the household or community is constrained, informal local networks naturally become the dominant and often the only reliable gateway to agricultural knowledge.

For cash crops like coffee, cashew, or cocoa, this matters a lot. According to authors, timely information received on pricing, market locations, and buyer opportunities tend to circulate informally and socially rather than through structured, formal dissemination systems (Amaechi & Ossai-Onah 2015; Rodriguez et al. 2015). Therefore, women who depend primarily on peer conversations or community exchanges may receive price information that is usually delayed, incomplete, or even reflective of a single buyer's offer rather than broader market conditions. On the other hand, male farmers more frequently engage with formal sources such as extension officers and input dealers (Bergman Lodin et al. 2019), such engagement with extension officers provides male farmers with information earlier and often more varied market signals. This asymmetry in source diversity most likely translates into unequal negotiating power between male and female farmers, especially in export-oriented crops, where price knowledge shapes whether farmers sell at a good or poor rate.

Formal sources play a meaningful role in reaching and providing both male and female farmers with agricultural information, even if their reach is limited. Extension agents are recognised as valuable providers of production knowledge; however, their engagement with rural women remains considerably constrained (Nlerum et al. 2012). According to literature, farmer associations and NGOs can function as important information agents that connect smallholder farmers to markets, improved practices, and even buyer linkages, but access to these structures usually

tends to depend on prior group membership or even proximity to active projects (Balasha et al. 2024; Bizikova et al. 2020). Radio communication is the most broadly accessible formal medium, reaching women in areas where other formal channels are absent, though information provided and sourced through this medium is rarely tailored to specific crops or women's particular constraints (Rodriguez et al. 2015). The net result is that formal information systems reach a portion of rural women but rarely reach them systematically or consistently.

The consequences of this uneven access become especially visible in how information about cooperative membership and collective marketing opportunities reaches women. Rather than flowing through official means or structured extension visits, for instance, awareness of cooperatives tends to arrive through the same informal conversations and peer interactions that carry general agricultural knowledge (Amaechi & Ossai-Onah 2015). Village meetings and community leaders serve as bridges between informal networks and more formal institutions, but these too are socially filtered. Women farmers who are already members of active farmer groups or cooperatives receive substantially richer and more structured information, including information on the benefits of collective action, while those outside such networks tend to rely on fragmented or secondhand information (Adu-Boahen et al. 2024; Bizikova et al. 2020). This creates a self-reinforcing cycle where women farmers with the strongest networks learn the most about groups that could improve their position while the most isolated women remain the least informed about the very mechanisms that could reduce their isolation.

Beyond the question of who provides information are the channels through which agricultural knowledge is communicated which are often shaped by gender. Female farmers face structural barriers to digital and formal delivery channels, including lower mobile phone ownership, limited digital literacy, and restricted internet connectivity (Sabharwal et al. 2020; Udisha & Ambily Philomina 2024). These barriers are not only technological but are also compounded by affordability issues, limited time to engage with media and in some contexts, social norms around women's use of mobile phones and other available platforms (FAO 2019). As a result, women more commonly engage through voice-mediated and face-to-face exchanges, particularly within local meetings, women's peer groups, and community gatherings. While these channels are somewhat effective at sustaining trust and conveying relevant agricultural knowledge, they also limit farmers' exposure to the kinds of information that travel easily through formal and digital spaces, such as price bulletins, cooperative registration processes and technical training on post-harvest quality standards (Ragasa et al. 2013; Idowu et al. 2021).

Male farmers, on the other hand, can more frequently access text-based platforms such as WhatsApp and SMS, and attend formal training sessions far more regularly. These channels carry technical updates, collective marketing information,

and coordination logistics relevant to export-oriented crops (FAO 2019). The gap is significant not just in terms of the volume of information received, but in its content. Formal training sessions and digital platforms are often where cooperative benefits, group marketing arrangements, and input subsidies are communicated first. When women are excluded from or underrepresented in these channels, they enter collective discussions with less background knowledge and, consequently, less capacity to advocate for their interests.

Trust-building dynamics also shape delivery channel preferences in gendered ways, where female farmers tend to rely on iterative and relational exchanges when verifying information, particularly for important decisions such as whether to join a cooperative or invest in a new input. This means that the same message about cooperative benefits or even the risks may need to be heard multiple times and from multiple trusted individuals before it can be acted upon (Farnworth et al. 2013; Meinzen-Dick et al. 2014). This is not a sign of scepticism or passivity; it reflects a well-founded approach to decision-making in environments where poor information has real livelihood consequences. On the other hand, male farmers tend more towards efficiency-driven interactions, for example, though a single telephone call to input dealers or a brief interaction with extension officers that are transaction-oriented rather than relationship-building (Bergman Lodin et al. 2019). These different communication styles have practical implications for how cooperative promotion messages should be designed and delivered if they are to reach women effectively.

In the specific contexts of Kenya and Nigeria, gender norms amplify these dynamics in contextually distinct ways (Bergman Lodin et al. 2019; Ngigi & Muange 2022). In Kenya, the participation of women farmers in training events and other formal agricultural meetings is frequently affected by household duties and expectations as well as mobility limitations, which reinforces time burdens without necessarily expanding access to market-relevant information (Ngigi & Muange 2022). In Nigeria, men continue to dominate formal agricultural networks and are more frequently identified as decision-makers in farming households, while women farmers majorly rely on informal channels such as radio programs and peer group conversations (Idowu et al. 2021).

2.6.4. Cognitive Factors of Cooperative Membership Intention

A farmer's attitude toward cooperative membership reflects the degree to which they personally evaluate joining cooperatives as either beneficial or detrimental, and a substantial body of empirical research confirms that more favourable attitudes are consistently associated with stronger intentions to join. Farmers who believe that cooperative membership will improve their market access,

secure better output prices, or provide more stable income tend to be more willing to participate in collective agricultural structures (Fischer et al. 2012; Verhofstadt & Maertens 2014). In the context of smallholder farming in SSA, attitudes are particularly shaped by prior experience with cooperatives, observed outcomes among neighbouring members, and the perceived credibility of information reaching farmers about what joining would involve (Miroro et al. 2023). Where past cooperative failures have left a legacy of distrust, as is documented in parts of both Kenya and Nigeria, even farmers who acknowledge the theoretical benefits of collective action may hold deeply ambivalent attitudes that suppress their stated intention to join (Nyairo et al. 2022; Ezekiel 2023). This means that attitudes toward cooperatives are not simply a product of rational information processing. They are also shaped by historical memory, peer observation, and the broader institutional environment in which farmers operate.

Subjective norms capture the social pressure a farmer perceives from important people in their life, whether family, peers, community leaders, or agricultural experts, to engage or not engage in a particular behaviour. In agricultural decision-making across sub-Saharan Africa, the normative environment within which farmers operate carries considerable weight, often more so than in contexts where individual autonomy is more culturally pronounced (Möllers et al. 2018; Dessart et al. 2019). Farmers who perceive that respected figures in their communities endorse cooperative membership are significantly more likely to express an intention to join, even when their own direct knowledge of cooperatives is limited (Skevas et al. 2022; Zhang et al. 2024). This dynamic is particularly relevant for cashew farmers in Nigeria and Kenya, where community elders, religious figures, and lead farmers carry normative authority in agricultural decisions. Bao et al. (2022) and Chavula et al. (2022) both document that subjective norms operate most powerfully when the source of normative pressure is someone the farmer already trusts and interacts with regularly. The implication is that social endorsement of collective action, through trusted voices rather than formal campaigns, may be one of the strongest levers available for shifting farmers' intentions.

Perceived behavioural control refers to a farmer's sense of how easy or difficult it would be to join a cooperative, encompassing both their belief in their own capacity and their assessment of external barriers. Research consistently shows that farmers who feel more in control of their ability to meet membership requirements, pay fees, manage time commitments, and navigate collective structures express considerably stronger membership intentions (Francesconi & Heerink 2011; Abebaw & Haile 2013). In smallholder settings, this construct maps closely onto real resource constraints. Farmers with smaller farm sizes, irregular income, or limited access to information about what joining requires often report low perceived behavioural control even when their attitudes are positive (Cechin et al. 2013; Mwambi et al.

2020). The gap between positive attitudes and actual intention, sometimes observed in cooperative membership studies, can frequently be traced back to low control perceptions rather than a lack of interest. For cashew farmers specifically, membership fees, the time demands of attending cooperative meetings during peak farming periods, and uncertainty about governance processes all function as perceived barriers that reduce control beliefs and, consequently, suppress intention to join. Maichum et al. (2016) demonstrated that perceived behavioural control mediates the relationship between attitude and intention, suggesting that even strongly motivated farmers may not translate their willingness into action if they perceive structural obstacles as insurmountable.

Beyond attitudes and social pressure, some farmers are motivated to join cooperatives by a sense of internal ethical duty, a feeling that participating in collective action is simply the right thing to do. This construct, referred to as moral norms, operates independently of subjective norms, reflecting the farmer's internalised values rather than others' expectations (Kaiser & Scheuthle 2003; Arvola et al. 2008). In agricultural cooperation research, moral norms have been found to reinforce intention in contexts where the collective good is salient, such as when farmers are aware that their individual decisions affect shared resources, community income, or the viability of a local commodity sector (Govindharaj et al. 2021). Lokhorst et al. (2011) found that farmers with a strong sense of duty toward their farming community were more likely to adopt collective practices, even in the absence of direct personal incentives. In the cashew sectors of Kenya and Nigeria, where production decline is widely evident, and many farmers recognise that individual action alone is insufficient to address ageing tree stock, low prices, and weak market links, moral norms may provide an additional motivational pathway. Liang et al. (2020) note that moral norms tend to amplify the effect of attitudes on intention, meaning that farmers who both hold positive views of cooperatives and feel a sense of responsibility toward their peers may be especially likely to commit to joining.

Knowledge about cooperatives, meaning farmers' understanding of how they function, what they offer, and how to join, is one of the most frequently cited cognitive precursors to cooperative membership intention in the empirical literature. Farmers who have a clear grasp of the benefits of collective marketing, the governance structures that protect member interests, and the practical steps involved in joining are substantially more likely to express positive intentions (Fischer et al. 2012; Mwambi et al. 2020). This relationship holds beyond simple awareness: the depth and accuracy of knowledge appear to matter, with farmers who have a more detailed and up-to-date understanding of specific cooperative functions reporting stronger intentions than those with only general or second-hand familiarity (Blekking et al. 2021; Liu et al. 2024). In Kenya and Nigeria, limited knowledge about how cooperatives work remains a widely documented barrier to participation, compounded in both countries

by histories of poorly governed or defunct cooperative structures that have left many farmers uncertain about whether the concept is reliable or relevant to their situation (Nyairo et al. 2022; Miroro et al. 2023). Reynolds (1997) and Bhuyan (2007) established early on that knowledge gaps are one of the principal reasons farmers with otherwise favourable attitudes still choose not to join. More recent work confirms this pattern and adds that knowledge influences intention both directly and through its effect on attitudes: farmers who understand cooperative benefits more fully tend to develop more positive evaluations of collective action, which, in turn, reinforce their intention to participate (Bagheri et al. 2019; Maleksaeidi & Keshavarz 2019).

2.7. Theoretical Framework

This thesis uses a combined theoretical approach to understand the intentions of farmers toward membership in agricultural cooperatives. The intention of farmers to join cooperatives is a complicated behaviour outcome influenced by economic rationality, psychological drivers and relationship contexts. The Random Utility Theory (McFadden 1982) provides a microeconomic foundation that helps to explain membership intention with the aim of maximising utility under information constraints where individuals assess expected benefits such as market access, against transaction costs. In addition to this, the Theory of Planned Behaviour (Ajzen 1991), which includes cognitive aspects such as attitudes towards perceived value of cooperative membership, subjective norms including peer or community expectations and perceived control over behaviour like resource availability; all these factors influence farmers' cooperative membership intentions. Lastly, the Social Capital Theory (Coleman 1988; Putnam 2000) explains how network connections, such as bonding and bridging social capital which provides agricultural knowledge and information, influence cooperative membership intentions among farmers. Altogether, these theories provide a complete view to comprehend membership intentions among farmers.

2.7.1. Random Utility Theory

The Random Utility Theory (RUT) provides a framework for understanding individuals' decision-making by incorporating both measurable characteristics and unobservable factors influencing decision-making (McFadden 1982). This framework model decision-making under uncertainty, wherein people assess risky options by calculating and comparing the weighted benefits (utilities) of potential outcomes against their probabilities, systematically selecting the option offering the highest form of satisfaction (Willis 2014). Hence, people will make choices from the characteristics of the good (an objective component) together with some degree of

randomness (a random component), which helps to reconcile theory with observed choice. Hence, RUT serves as a foundational framework for modelling discrete choices across diverse fields by quantifying how individuals select options based on latent preferences and observable constraints. Based on this framework, a farmer's intention to join an agricultural cooperative can be understood through a double discrete choice model, which assumes that a farmer will join a cooperative if the anticipated benefits outweigh the perceived costs of membership. The theory posits that a farmer's decision hinges on the expectation that cooperative membership offers greater advantages than associated expenses.

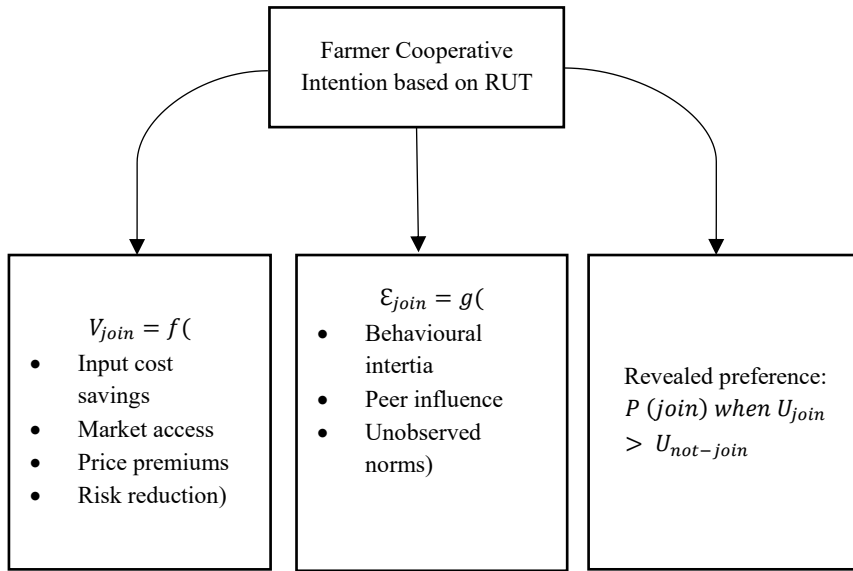


Figure 6. RUT Framework for cooperative membership intention

The RUT model (Figure 6) a farmer will decide to join if the utility of joining (U_{join}) exceeds the utility of not joining ($U_{not-join}$), where U_{join} combines measurable economic benefits (V_{join} - example, input cost savings, market access, price premiums, risk reduction) with unobservable psychological and social factors such as behavioural inertia, peer influence, and unobserved norms. However, even when V_{join} outweighs costs, negative E_{join} components like fear of exploitation can reduce U_{join} below $U_{not-join}$, resulting in less than 100% adoption probability ($P(join)$) despite apparent economic advantages.

While cooperatives offer theoretical benefits like supply chain access, marketing support, and profit-sharing (Sexton & Iskow 1988; Sexton 1990), farmers' perceived benefits may diverge from realised outcomes as a result of implementation gaps. Notwithstanding, membership also empowers farmers to address economic

imbalances by establishing institutional safeguards against exploitation and opportunistic behaviour (Cook 1995; Sykuta & Cook 2001). Cooperatives that manage production processes downstream and control input supply upstream can secure better prices for farmers' produce, reduce input costs, and improve market access (Sexton & Iskow 1988; Giannakas & Fulton 2005). Additionally, collective action within cooperatives helps to internalise transaction costs, which benefits members through shared efficiencies and aligned incentives, such as higher producer prices and streamlined information exchange (Holger Bonus 1986; Staatz 1987; Valentinov 2007).

Of note, RUT accommodates heterogeneity in farmers' preferences and contextual constraints, a feature essential for comparative analyses of institutionally distinct systems like Nigerian and Kenyan cashew production (Train 2009). This suggests that differences in market structures, cooperative histories, policy support, and farmer demographics imply that the utility farmers associate with cooperative membership is not uniform and must be empirically investigated within each context (Uchezuba et al. 2016).

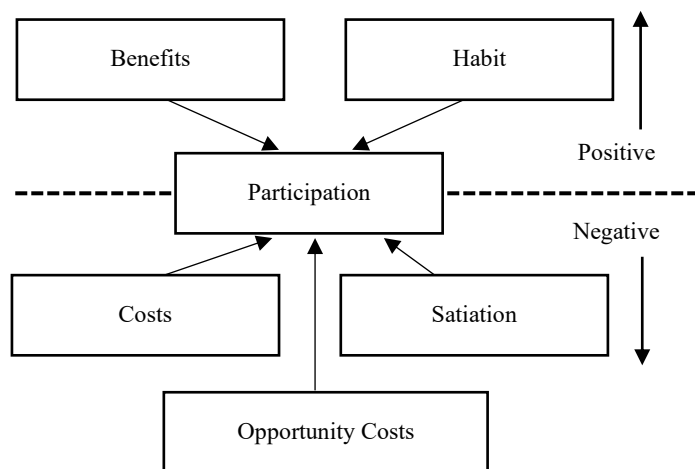


Figure 7. Individualistic incentives framework by Birchall & Simmons (2004)

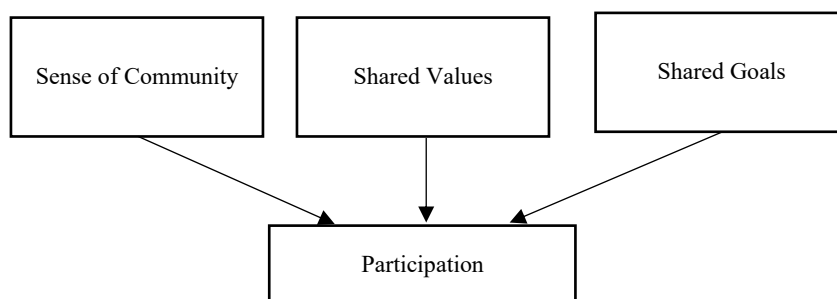


Figure 8. Collective incentive framework by Birchall & Simmons (2004)

According to Birchall & Simmons (2004), the benefits of cooperative membership are derived from a dual framework of individualistic (Figure 7) and collectivistic incentives (Figure 8), with the latter emerging as the primary driver of sustained participation. Collectivistic benefits, which are rooted in a strong sense of community, shared ethical values, and collective goals, foster trust and solidarity among members, enabling democratic governance and reducing exploitation risks. These communal advantages create a “co-operative advantage” by aligning member interests with organisational principles, which improves accountability and long-term resilience. On the other hand, individualistic benefits, while secondary, remain significant: participation yields intrinsic rewards such as skill development, personal fulfilment, and learning experiences, although extrinsic motivators like financial incentives proved minimal in practice. Furthermore, authors suggest that realising these benefits requires synergistic alignment of resources (for example, confidence from prior experience), mobilisation (for example, face-to-face recruitment through trusted networks), and motivational reinforcement through responsive feedback loops. However, beyond these tangible benefits, cooperative membership also offers intangible advantages, such as ensuring opportunities for democratic participation in governance structures (Verhees et al. 2015). However, this benefit comes with potential costs, including the time and effort required for fulfilling membership obligations. Members often need to participate in decision-making processes, take on leadership roles, and monitor the activities of cooperative management, which can result in opportunity costs and other commitments (Fulton & Giannakas 2001; Bontems & Fulton 2009).

By employing the RUT as an analytical lens or approach, the farmer, farm-specific, and institutional factors that affect farmers’ intention to join cooperatives are examined through a dual utility-cost framework. In this context, a farmer will choose to join a cooperative if the perceived utility (encompassing both individualistic benefits like skill development and collectivistic advantages such as shared market access) outweighs the associated costs. These costs are systematically categorised into dimensions according to Birchall & Simmons (2004): direct costs (time commitments, membership fees, and transaction costs of collective action), opportunity costs (forgone income alternatives and loss of individual autonomy in decision-making), and satiation (diminishing returns from cooperative benefits over time). RUT models this as a discrete choice influenced by observable factors (for example, farm size, education) and unobservable factors (for example, trust in collective governance), capturing heterogeneity in farmers’ trade-off evaluations.

Based on the study established by Wollni & Zeller (2007), who applied RUT to coffee farmers’ marketing decisions in Costa Rica, the likelihood of cooperative membership increased with perceived economic gains from collective marketing. However, it was also influenced by farm size, distance to markets, and access to

extension services. Empirical evidence from Ethiopia also confirms that farmer and farm-specific characteristics shape farmers' utility for cooperative membership. Abebaw & Haile (2013) demonstrated that membership was positively associated with factors such as age of household, gender of household (that is, being male), leadership experience and geographic location. According to Ortmann & King (2007a), older farmers may value the stability and reduced market risks offered by cooperatives more, while younger farmers might prioritise autonomy and flexibility (Ortmann & King 2007b). Also, education enhances farmers' ability to assess the benefits and obligations of cooperative membership, leading to a higher likelihood of joining (Verhofstadt & Maertens 2014). Likewise, risk-averse farmers tend to perceive cooperatives as a mechanism for risk-sharing and are therefore more inclined to participate (Mojo et al. 2017). According to Zheng et al. (2012) and Miroro et al. (2023), larger farm sizes and higher output volumes often increase the attractiveness of cooperative membership, as collective marketing and economies of scale offer greater proportional returns. Conversely, farmers with limited marketable surplus may find the transaction costs of participation outweigh the benefits, thus opting out. The land tenure status, access to irrigation, and diversification of income sources similarly affect the expected utility derived from cooperative membership (Barrett 2008).

Aside from farmer and farm-specific factors, institutional factors such as better access to extension service were also found to influence cooperative membership (Abebaw & Haile 2013). According to the authors, access to information positions them to actively promote cooperatives through farmer discussions, directly shaping membership choices (Abebaw & Haile 2013). Furthermore, according to Francesconi & Heerink (2011) and Fischer & Qaim (2012), farmers in regions where cooperatives demonstrate high participation rates, effective mobilization (such as face-to-face recruitment via trusted networks), and tangible collective benefits (for instance, price premiums, innovation access) are significantly more likely to join, as these institutional conditions amplify perceived utility while mitigating transaction costs and risks. Additionally, the presence of trustworthy leadership, transparency mechanisms, and democratic governance within cooperatives enhances perceived utility, reducing fears of mismanagement (Markelova & Meinzen-Dick 2009). Trust in cooperative leadership and fellow members reduces perceived risks, making membership more attractive (Barham & Chitemi 2009). Also, farmers embedded in strong community networks, characterised by frequent interactions and shared norms, are more likely to join and remain active in cooperatives, as collective action becomes easier to coordinate (Ostrom 1990; Narayan 1999). In addition to economic considerations, farmers also weigh social benefits – such as increased bargaining power, enhanced knowledge sharing, and the prestige associated with cooperative membership - when making decisions (Hao et al. 2018; Kalogiannidis et al. 2024).

This multi-dimensionality of utility aligns with the core assumption of RUT that decision-making involves both tangible and intangible trade-offs.

In sub-Saharan Africa, studies on cashew, coffee, and cocoa reveal similar institutional patterns in cashew, coffee, and cocoa cooperatives, where effective member participation systems and equitable resource distribution critically influence smallholder engagement (Adeogun et al. 2010; Shiferaw et al. 2011). For instance, Shiferaw et al. (2011) reported that farmers in sub-Saharan Africa were more likely to join cooperatives that provided democratic participation, transparency and accountability in their system of governance. In Nigeria, Adeogun et al. (2010) observed that access to cooperative-organised processing facilities significantly raised cocoa farmers' willingness to participate, emphasising the role of institutional services in utility maximisation.

Applying RUT, this study acknowledges that farmers' decisions to join cooperatives are complex and multifaceted, shaped by personal characteristics, farm-specific conditions, institutional settings, and social dynamics. It provides a theoretical basis for modelling and examining the factors that influence cooperative membership among cashew farmers in Nigeria and Kenya, offering insights for designing targeted interventions to strengthen cooperative participation.

While RUT effectively models observable utility trade-offs underlying membership decisions, it implicitly assumes farmers act as rational optimisers with stable preferences (Čop & Njavro 2022). However, psychological and perceptual factors such as subjective confidence in collective efficacy or perceived social pressures may systematically alter cost-benefit calculations (Birchall & Simmons 2004; Fischer & Qaim 2014). This limitation necessitates complementing RUT with frameworks that explicitly account for social-cognitive processes (Bandura 2001). The Theory of Planned Behaviour (TPB) addresses this gap by theorising how attitudes, subjective norms, and perceived behavioural control mediate intention formation (Ajzen 1991). Integrating both RUT with TPB allows a more holistic examination where RUT captures structural constraints and revealed preferences, while TPB explains how farmers' internalised beliefs and social environments mediate institutional opportunities.

2.7.2. Theory of Planned Behaviour

The TPB postulates that an individual's behaviour can be predicted by their behavioural intentions (Ajzen 2011; Kaplan et al. 2015), which are influenced by three key factors: attitudes, subjective norms, and perceived behavioural control (Maichum et al. 2016; Senger et al. 2017). Underlying behavioural, normative, and control beliefs shape these factors. According to this theory, behavioural intentions are influenced by these beliefs about the presence or absence of factors that facilitate or hinder the performance of the behaviour, often based on past experiences or observations of

others (Bagheri et al. 2019; Ataei et al. 2022). Literature indicates that attitudes, subjective norms, and perceived behavioural control are positively associated with behavioural intentions, supporting the applicability of TPB in predicting various behaviours, including farmers' intentions to join cashew marketing co-operatives (Lalani et al. 2016; Rezaei et al. 2018; Bagheri et al. 2019; Vaz et al. 2020).

The TPB (Figure 9) serves as a valuable framework for the psychological factors influencing the intention to join producer groups among smallholder farmers (Senger et al. 2017; Xu et al. 2022). Underlying beliefs and experiences influence farmers' behavioural intentions. For instance, farmers' attitudes toward collective action – shaped by past experiences with cooperatives or awareness of the benefits – may significantly affect their willingness to join such groups (Miroro et al. 2023). Additionally, subjective norms within the community, such as the influence of friends, can either encourage or hinder membership in producer groups (Skevas et al. 2022). Also, perceived behavioural control, influenced by factors such as access to resources and knowledge about cooperatives, will likely affect farmers' confidence in their ability to adopt a behaviour (Zeweld et al. 2017). Farmers with a greater understanding of the benefits and operations of producer groups are more likely to form positive attitudes towards joining.

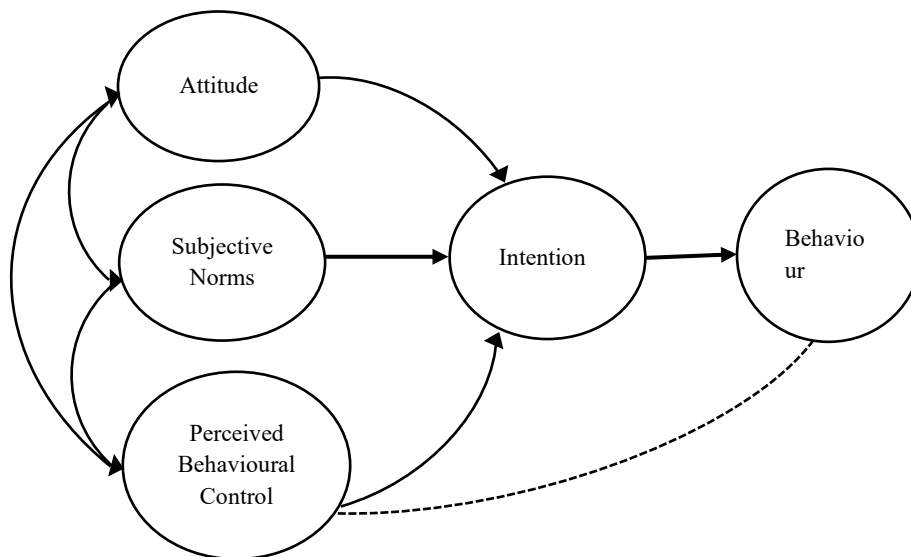


Figure 9. TPB framework by Ajzen (1991)

Since the introduction of the original TPB framework pioneered by Ajzen (1991), various expansions of this theory arose later, and several new variables were postulated, which became known as expanded TPB. In the extended version of the

TPB, additional elements, such as knowledge about co-operatives and moral norms, have been integrated (Bagheri et al. 2019; Maleksaeidi & Keshavarz 2019; Govindharaj et al. 2021). Knowledge is identified as a crucial phase among the five stages of decision-making in adopting innovations, as noted by Taherdoost (2018). The significance of the 'knowledge' variable is frequently emphasised in research, mainly due to its association with shaping stronger attitudes towards certain behaviours (Zeweld et al. 2017; Möllers et al. 2018). Similarly, moral norms, rooted in ethical considerations and social responsibility, also play a significant role in influencing a farmer's intention to engage in collective action, especially if they view such behaviour as aligned with their values and community welfare. These additional variables stress the complexity of decision-making in smallholder farmers, highlighting how their intentions are not solely determined by external factors, but also by internalised beliefs and values that guide their actions (Dessart et al. 2019; Nyairo et al. 2022).

Arvola et al. (2008) elaborated on the concept of moral norms, emphasising its role in shaping people's actions according to internalised standards of right and wrong. These norms are often motivated by internal rewards or avoidance of self-guilt (Kaiser & Scheuthle 2003; Liang et al. 2020). For instance, farmers with a strong conservationist identity are more likely to engage in environmentally friendly practices (Lokhorst et al. 2011). Strong moral norms favour farmers' intention to join self-help groups. Hence, including moral norms in the TPB model provides a broader understanding of behavioural intentions by highlighting the role of internal ethical standards.

On the other hand, understanding the benefits and functioning of marketing cooperatives is essential, as research shows that farmers with better knowledge about cooperative structures, market access, and fair pricing mechanisms are more likely to participate in cooperatives (Fischer & Qaim 2012; Mwambi et al. 2020). However, a lack of cooperative knowledge, especially with the historical challenges faced within previous cooperative engagement in Kenya and Nigeria, might lead to scepticism and reluctance to join cooperatives (Nyairo et al. 2022; Ezekiel 2023; Miroro et al. 2023). The inclusion of knowledge in the TPB model allows for a better understanding of how well-informed farmers are about cooperatives and how this affects their behavioural intentions. In the case of cashew farming in Nigeria and Kenya, psychological factors such as a farmer's personal beliefs about the benefits of cooperatives, the influence of family and community expectations, and the perceived ease or difficulty of participation can all interact to shape farmers' intention towards cooperative membership.

In essence, the TPB provides a theoretical lens through which to analyse the complex psychological dynamics that govern smallholder farmers' intentions to join producer groups. By considering attitudes, subjective norms, and perceived

behavioural control, this study aims to understand the psychological drivers of participation in collective action within the cashew value chain in Nigeria and Kenya, offering insights into how psychological factors shape farmers' decisions to engage in producer groups.

2.7.3. Social Capital Theory

While RUT and the TPB provide crucial insights into the individual cognitive processes and utility measurements underpinning cooperative membership intentions, it is essential to consider how social structures facilitate or constrain the factors these theories address since individual decisions are embedded within broader social contexts (Ter Wal et al. 2016; Bourne et al. 2017). To capture the influence of these relational structures, Social Capital Theory (SCT) offers a vital complementary perspective. Focusing on the influence of bonding and bridging social capital, this theory explains how a person's position within social networks influences their access to relevant information and the quality of that information – both key determinants influencing the formation of intentions regarding cooperative membership intentions.

This SCT has been widely used to understand the role of social networks, trust, and social relationships in decision-making, particularly in agricultural contexts. SCT emphasises the importance of social connections and collective action in facilitating cooperation and shared benefits (Putnam 2000). According to Putnam (2000), social capital is categorised into bonding and bridging social capital. Each of these types play a distinct role in the intention to join a cooperative and can influence the most used sources and delivery channels of information.

The intention of farmers to join cooperatives is often not just an economic one but also a social one, influenced by the trust and relationships farmers have within their communities and networks (Kolade & Harpham 2014; Abad et al. 2020). According to SCT, farmers' social networks (which includes family, neighbours, and peers) serve as primary channels for information flow. These networks allow farmers to access both formal and informal knowledge about cooperatives, such as their potential benefits, the trustworthiness of their management, and the processes involved in joining (Yu et al. 2013). Trust, which is a main part of the SCT, plays an important role in this context. Farmers usually join cooperatives when they have faith in the institution and see it as a reliable source for help (Coleman 1988).

Bonding social capital are strong relationships within close-knit groups, such as between family and friends, are marked by high levels of trust and emotional support. The ties within this network facilitate the sharing of local knowledge and mutual assistance (Coleman 1988; Putnam 2000). According to Coleman (1988) and Putnam (2000), the mutual aid and enforcement of norms inherent in bonding social capital could encourage farmers to adopt new practices or join co-operatives based on the endorsements of their close contacts. Also, farmers with strong bonding social

capital often rely on these networks for information, as they trust the people within these circles. Close relationships may also increase the likelihood of farmers being informed about the benefits of cooperatives, especially when these benefits are shared through word-of-mouth within trusted networks. According to studies by Fischer & Qaim (2012) and Verhofstadt & Maertens (2014), farmers who are embedded within close-knit networks and who consistently have access to quality and timely agricultural information that shapes their production decisions, strengthens their confidence, and deepens their understanding of collective action are more likely to become members in farmers' groups, as the trust, shared learning, and sustained information exchange cultivated within those groups naturally inform them toward more structured and institutionalized forms of cooperation. But, while bonding social capital is essential for building trust, cohesion and localized knowledge among farmers, it may limit access to broader, innovative ideas and resources (Rooks et al. 2012; Zhang et al. 2020).

Bridging social capital goes beyond a person's immediate social circles to other networks at higher societal levels. These types of networks facilitate access to novel information, resources, and opportunities (Woolcock & Narayan 2000). According to authors such as Granovetter (1973) and Micheels & Nolan (2016), farmers with higher bridging social capital are more likely to adopt innovative practices and engage in market-oriented activities due to the broader range of accessible resources and information. Farmers who have networks across communities, farmer associations or peer groups are more likely to embrace innovations and pursue market-oriented activities due to exposure to heterogeneous knowledge (Slijper et al. 2022). These types of networks and association empowers farmers to secure technical assistance or skills training from horizontal networks, which could enhance their intention to join cooperatives (Woolcock 2001; Klerkx & Proctor 2013). Hence, according to Tenganpoe et al. (2024), while bonding social capital helps to provide trust and support within communities, bridging social capital is crucial for allowing farmers the exposure to resources and opportunities outside of their immediate circle. This makes both forms of social capital crucial for making informed decision in agricultural settings (Tenganpoe et al. 2024).

According to literature by Bergman Lodin et al. (2019) and Ayanlade et al. (2023), the access to and structure of social capital in Kenya and Nigeria are deeply gendered. This directly shapes and influence farmers' most used form of information delivery channels. As emphasised by Bergman Lodin et al. (2019), women farmers often face systemic barriers which limits their participation in formal and mixed-gender networks typically dominated by men (for instance, cooperative boards, extension meetings), thereby restricting their access to bridging capital (Bergman Lodin et al. 2019). The exclusion of women farmers from such networks increases their overall reliance on alternative sources of agricultural information which,

according to Egbe et al. (2024), forces these farmers to develop their unique forms of social capital in their own spaces. They develop strong bonding capital within homophilous networks of other women farmers, facilitated through informal gatherings, savings groups, or communal labour (Egbe et al. 2024). These new and constrained networks become vital avenues for sharing and exchanging agricultural information rooted in shared lived experience such as advice on crops, farming techniques, or even challenges uniquely relevant to women's roles and resource constraints (Farnworth et al. 2013; Egbe et al. 2024). Therefore, SCT explains not just the limitations in accessing information but also the gendered adaptations and techniques developed within farmers networks. Where formal channels and networks fail to provide agricultural information to women, they utilize intimate and trust-based associations to access relevant knowledge which then shapes their communication preferences regarding interpersonal, informal exchanges (Egbe et al. 2024).

According to authors like Ayanlade et al. (2023), these gendered forms of social capital becomes more complicated by intersectional circumstances such as religious and cultural norms, which require a context-specific analysis, as indicated. In agricultural communities, religion often dictates normative boundaries for social interaction, directly governing network formation and communication access. For example, across several Muslim communities in Northern Nigeria or Coastal Kenya, purdah norms or gender segregation may constrain physical mobility and also the participation of women in public participation which limits their ability to build bridging ties with external actors (for instance, with male extension agents, traders) or access government institutions (Kingiri 2010; Ludgate 2015). On the other hand, most women in Christian communities in Southern/Western Nigeria or Western Kenya, for instance, might experience greater (yet unequal to male farmers) freedom to engage in farmer groups or church-affiliated networks occupied by both male and female members, potentially expanding their access to diverse information sources (Ayanlade et al. 2023). These religious contexts create fundamentally different "social capital portfolios" for women (Woolcock 2001; Ter Wal et al. 2016). SCT must therefore be applied intersectionally, as a woman's communication channels are influenced by her gender, religion, and location, whether they are based on closed female kinship groups (which are common under strict seclusion) or include faith-based associations (Crenshaw 1989; Agarwal 2010; Höpflinger et al. 2012).

In keeping with established empirical practice in smallholder studies (Cofré-Bravo et al. 2019; Tenganpoe et al. 2024), social capital is operationalised in this thesis through the formality of the most utilised agricultural information source: bonding (informal: family, friends, neighbouring farmers) and bridging (formal: extension officers, cooperative officials, input dealers, agricultural experts). The construct is therefore deliberately measured at the level of information access, the dimension of social capital most directly relevant to cooperative membership decision-making.

3. Aim of the Thesis

Despite cashew farming in SSA receiving increased attention over the years as a major export commodity, there exist important gaps regarding what influences farmers' cooperative membership intentions. There are limited comprehensive studies that synthesise both observable (farmer, farm and household characteristics, social capital variables) and psychological determinants along the export-oriented cashew value chain. While several studies have established the importance of economic and environmental factors as determinants to membership in cooperatives, they have often overlooked the crucial importance and the interplay of farmer, farm and household characteristics, social capital networks, and the underlying psychological constructs that shape decision-making among farmers. Therefore, existing literature provide an incomplete picture of farmers decision-making process by failing to incorporate these human-centred dimensions and thus prevents tailored policy interventions that would boost farmers' participation in collective action. Therefore, cooperatives might face uneven recruitment patterns, which can affect the sector's overall performance. Secondly, there is a gap regarding the role of communication dynamics and how this shapes farmers' cooperative membership intentions. While majority of research address communication preferences and cooperative membership as distinct concepts, they fail to account for gendered access to informational resources, such as females' reliance on bonding social capital over males' wider access to extension agents and how these influences farmers' overall perceptions of cooperative benefits. Lastly, while policy environments may be different, such as cooperative reforms in Kenya as well as Nigeria's export promotion policies, there is a lack of multi-country research that investigates communication factors on cooperative membership intentions. This gap prevents context-appropriate recommendations that can be developed on policies across SSA. Therefore, the thesis fills this gap by developing a comprehensive framework that analyses how farmer, farm and household factors, psychological factors, social capital factors, and gender dynamics altogether influence farmers' intention to join cashew cooperatives in Kenya and Nigeria.

3.1. Research Objectives

The overall objective of this thesis is to examine, in an integrated manner, the farmer, farm, household, institutional (encompassing social capital and communication), and psychological determinants of smallholder cashew farmers' intentions to join formal export-oriented cooperatives in Kenya and Nigeria. To operationalise this objective, the thesis pursues three specific objectives, drawing on the integrated theoretical framework of RUT, extended TPB, and SCT.

The specific objectives are:

1. To examine the influence of farmer, farm, household factors and social capital dynamics on farmers' intentions to join export-oriented cooperatives in Kenya and Nigeria;
2. To assess the psychological determinants of farmers' intention to join export-oriented cooperatives through the lens of an extended Theory of Planned Behaviour model, incorporating knowledge and moral norms constructs;
3. To examine the gendered dimension of farmers' access to information sources and delivery channels and identify potential disparities in access to agricultural information.

3.2. Research Hypotheses

Over the past decades, the role of cooperatives in the agricultural sector across SSA has received significant attention. According to authors such as Shiferaw et al. (2011), Mutonyi (2019) and Kwizerimana et al. (2023), agricultural cooperatives possess the ability to improve the livelihoods of farmers, enhance their access to markets and resources, and provide collective bargaining opportunities. In Kenya and Nigeria, where cashew is regarded as a crucial agricultural export commodity, it is essential to understand the determinants of farmers' intentions to join cashew cooperatives, with a view to strengthening the value chain. This thesis is therefore designed to examine these determinants and to provide a context-specific understanding of cooperative membership intentions among smallholder cashew farmers. The following hypotheses are formulated to align with the analytical methods used to test each objective.

For objective one which focuses on the influence of farmer, farm and household factors, and social capital dynamics on farmers' intentions to join export-oriented cooperatives in Kenya and Nigeria (using probit regression analysis), the first hypothesis (H1) postulates that farmers whose primary agricultural information sources fall within bridging social capital, will exhibit a more positive intention towards cooperative membership than farmers relying primarily on bonding social capital and informal channels of delivery. Inspiration for H1 is based on the foundational social capital literature which differentiates between bridging ties which connect individuals across heterogeneous networks, granting access to novel information and resources; and bonding ties, which provide trust and emotional support within homogeneous networks (Granovetter 1973; Putnam 2000; Woolcock & Narayan 2000; Woolcock 2001). At the same time, it also draws on empirical evidence from cooperative membership and collective action research in agricultural contexts which consistently shows that farmers' access to bridging information

sources such as extension services and cooperative officials and their engagement with formal communication structures, such as trainings and farmer events, are positively associated with cooperative participation, while farmers' reliance on informal interpersonal networks alone tends to be insufficient to overcome perceived institutional risks (Verhofstadt & Maertens 2014; Cofré-Bravo et al. 2019; Mwambi et al. 2020; Slijper et al. 2022; Tengapoe et al. 2024).

For the second objective which focuses on psychological determinants of farmers' intention to join, the second hypothesis (H2) postulates that farmers' knowledge of cooperative functions and benefits is positively associated with their intentions to join cooperatives, both directly and indirectly through attitudes, subjective norms, and perceived behavioural control. This hypothesis is grounded in the original Theory of Planned Behaviour (Ajzen 1991, 2011), which holds that behavioural intention is jointly shaped by the constructs of attitudes, subjective norms, and perceived behavioural control, and in subsequent extensions of the model that incorporate knowledge as an additional cognitive predictor of agricultural behavioural intentions (Bagheri et al. 2019; Maleksaeidi & Keshavarz 2019; Govindharaj et al. 2021). Evidence from literature suggests that farmers' knowledge of cooperative structures, benefits and governance influences both direct intention to join, and also other constructs of attitude and subjective norms that mediate that intention (Engel et al. 2017; Adnan et al. 2018).

For objective three which focuses on the gendered dimensions of farmers' information sources and delivery channels, and on identifying potential disparities in access to agricultural information (using Chi-Square tests of independence), the third hypothesis (H3) postulates that there is a statistically significant association between the gender of cashew farmers and their most used agricultural information sources and delivery channels in the study areas in Kenya and Nigeria. Literature has long argued that male and female farmers occupy structurally different positions within agricultural information systems as a result of mobility constraints, time poverty, smaller and more homogeneous social networks among women, and unequal access to formal extension services (Fletschner & Mesbah 2011; Ragasa et al. 2013; Peterman et al. 2014; Mudege et al. 2017; Bergman Lodin et al. 2019; Idowu et al. 2021; Ngigi & Muange 2022; Zougmore & Partey 2022). However, the direction and magnitude of these gender effects in SSA agriculture are reported inconsistently in the empirical record. Some studies find pronounced disparities in farmers most used information sources and delivery channels (Doss & Morris 2000; Meinzen-Dick et al. 2014; Mudege et al. 2017) while others find that gender effects reduces or disappears in commercialised export-oriented sectors where shared market requirements impose more uniform information needs across producers (Farnworth et al. 2013; Doss et al. 2015).

Based on the foregoing, the following hypotheses are proposed:

H1: Farmers whose main agricultural information sources fall within formal social capital will have a more positive intention towards cooperative membership than those relying on informal networks.

H2: Farmers' knowledge of cooperative functions and benefits is positively associated with farmers' intentions to join cooperatives, both directly and indirectly through attitudes, subjective norms, and perceived behavioural control.

H3: There is a statistically significant association between the gender of cashew farmers and their most used agricultural information sources and delivery channels in the study areas in Kenya and Nigeria.

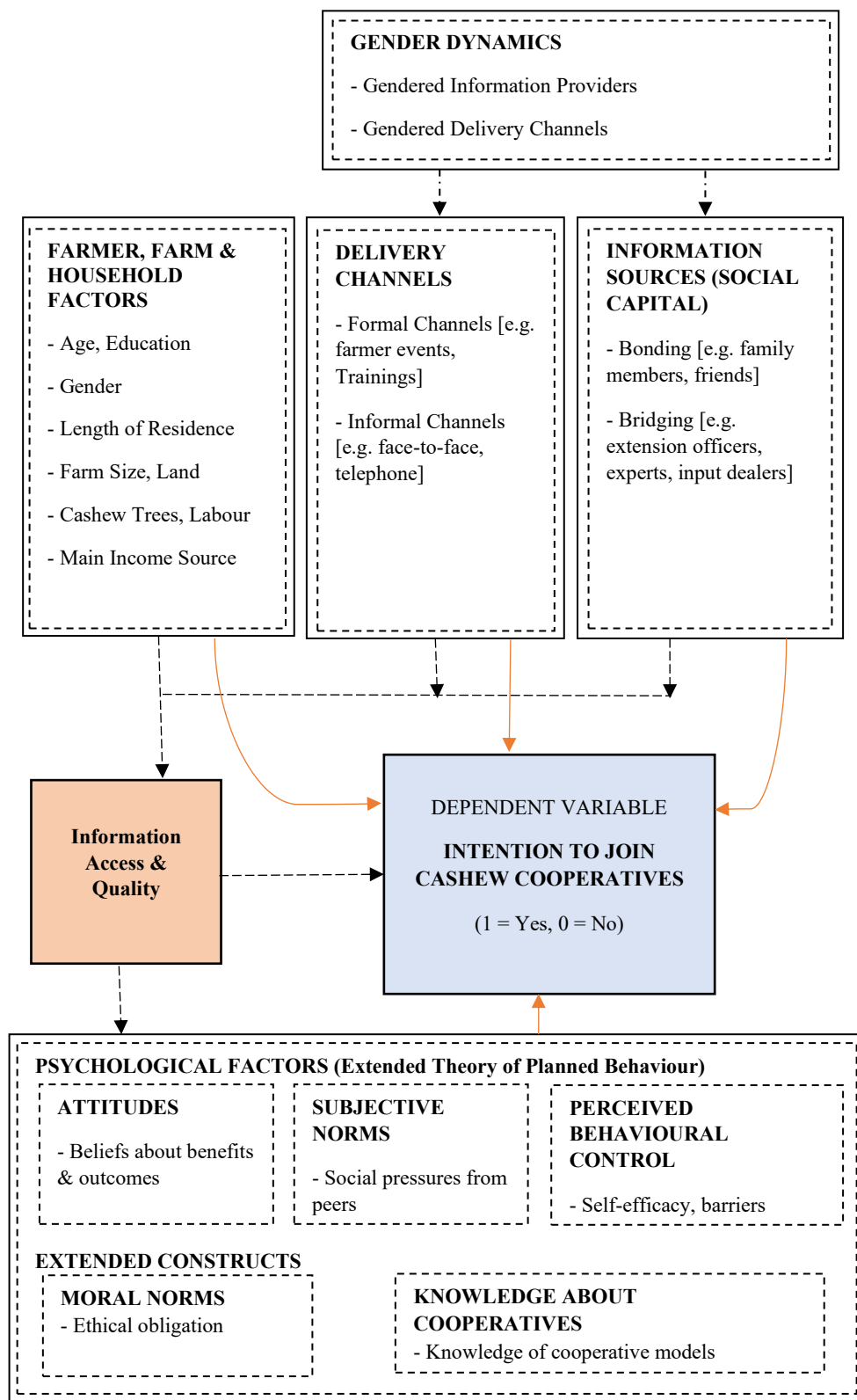


Figure 10. Conceptual Framework (Author's construct)

3.3. Conceptual Framework

Figure 10 outlines the conceptual framework of the thesis, positioning information access and quality as the central mechanism influencing cooperative membership intentions in African cashew export value chains. It conceptualises how farm and household factors, social capital and psychological variables interact to influence cooperative membership intentions in Kenya and Nigeria, two countries treated as case studies in this research. Table 3 presents the summary of variables in the study and their expected direction.

Table 3. Summary table: Variables, literature support, and expected effects

Variable	Key literature	Expected direction	Justification
Age	(Fischer & Qaim 2012; Abebaw & Haile 2013)	Positive (+)	Older farmers prefer stability; younger farmers may avoid collective constraints.
Gender	(Peterman et al. 2014; Meinzen-Dick et al. 2019)	Mixed ($\pm$)	Males often dominate membership, but female-only cooperatives show success.
Education	(Wollni & Zeller 2007; Bernard et al. 2010)	Positive (+)	Higher education increases awareness of cooperative benefits.
Length of Residence	(Matuschke & Qaim 2009; Ito et al. 2012)	Positive (+)	Longer residency builds trust in collective action.
Main Income Source (Cashew)	(Markelova & Meinzen-Dick 2009; Ma & Abdulai 2016)	Positive (+)	Cashew-dependent farmers seek price stability via cooperatives.
Number of Cashew Trees	(Bernard & Spielman 2009; Fischer & Qaim 2012)	Positive (+)	Larger surpluses make collective marketing attractive.
Farm Size (Ha)	(Abebaw & Haile 2013; Mojo et al. 2017)	Positive (+)	Economies of scale favour cooperative membership.
Landowner	(Deininger et al. (2012); Holden et al. (2008) (Deininger et al. 2011; Tesfaye et al. 2023)	Positive (+)	Landowners have autonomy to join; tenants face barriers.
Number of Hired Labour	(Bijman et al. (2012); Wollni & Zeller (2007) (Wollni & Zeller 2007; Bijman & Hanisch 2012)	Positive (+)	Commercial farmers benefit from bulk sales via cooperatives.
Information Sources (Social Capital)	(Anderson & Feder 2007; Matuschke & Qaim 2009)	Mixed ($\pm$)	Formal sources (bonding social capital) encourage membership; informal sources (bridging social capital) may substitute.

Delivery Channels	(Nagar et al. 2021; Mwenda et al. 2023; Tengapoe et al. 2024)	Mixed ($\pm$)	Formal channels of delivery builds institutional trust, reduces perceived risks
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Empirical research shows that farmers' intentions to join agricultural cooperatives are influenced by a set of farmer, farm and household characteristics, and social capital conditions. In terms of households' characteristics, demographic variables such as age (Mojo et al. 2017), gender (Ahado et al. 2021), and education (Wollni & Zeller 2007) are consistently associated with the likelihood of membership. Age, for instance, appears to influence how farmers perceive the role of cooperatives. Younger farmers often regard them as opportunities for learning, skill development, and improved market access, whereas older farmers tend to value cooperatives for their capacity to reduce risk and facilitate the transfer of knowledge across generations (Mojo et al. 2017). In terms of gender dynamics, which further complicates farmers' intentions to join cooperatives, inequalities in land ownership as well as access to social networks shape participation patterns, with women frequently turning to cooperatives as a way to navigate structural constraints (Meinzen-Dick et al. 2014). Social embeddedness within the community also matters. Farmers who have lived longer in a given locality are generally more likely to trust collective institutions, which in turn increases their propensity to engage in cooperative action (Matuschke & Qaim 2009; Meinzen-Dick et al. 2019). In addition, reliance on cashew as the primary source of income heightens sensitivity to price fluctuations, making the price-stabilising function of cooperatives particularly attractive (Ma & Abdulai 2016).

Farm-level characteristics add another layer of explanation. Farm size and land tenure security are especially relevant. Larger land holdings (typically above two hectares) as well as secure ownership rights typically create conditions that support economies of scale and encourage longer-term investments in collective arrangements (Deininger & Jin 2006; Markelova & Meinzen-Dick 2009). The number of cashew trees (often used as a proxy for marketable surplus) has been positively associated with cooperative engagement where farmers with higher tree density are more likely to join or participate in cooperative activities (Bernard & Spielman 2009). Similarly, the use of hired labour signals a higher degree of commercialisation, which tends to increase the value farmers attach to organised marketing channels provided by cooperatives (Bijman & Hanisch 2012).

Institutional influences operate primarily through advisory systems (in terms of sources and delivery channels). Access to agricultural advice, usually through formal extension systems or peer networks, reduces information asymmetries among farmers. This exposes farmers to evidences about the benefits of collective action. Studies suggest that farmers who engage with such sources are between 23 and 40 percent more likely to become cooperative members (Anderson & Feder 2007; Engel

et al. 2017). Taken together, these individual, farm-level, and social capital dimensions form the analytical basis for the probit model specified in this study.

Beyond these structural determinants, the conceptual framework presented in Figure 10 incorporates psychological factors that shape intention formation. A farmer's overall assessment of cooperative membership as either positive or negative is captured by the attitude construct. These assessments are based on the assumptions concerning anticipated advantages, such as enhanced market accessibility and increased price stability (Zamasiya et al. 2017). Subjective norms are the perceived social pressure from respected and important networks within a farmer's circle such as peers, family members or community leaders. The opinions of these individuals can significantly influence farmers' decision-making (Xu et al. 2022). Perceived behavioural control reflects farmers' confidence in their ability to overcome practical barriers to joining, such as administrative procedures or financial requirements (Zolait 2014; Lalani et al. 2016).

Moral norms introduce an additional layer which draws attention to a farmer's sense of obligation toward community welfare and sustainable practices. According to authors like Kaiser & Scheuthle (2003) and Savari et al. (2023), these ethical considerations sometimes shape and encourages farmers' participation in group activities or collective actions which advances common or shared interests (Kaiser & Scheuthle 2003; Savari et al. 2023). Finally, the knowledge construct concerns a farmer's understanding of how cooperatives work. This often include the benefits and also the potential challenges that arise when participating in agricultural cooperatives. A clearer understanding of these aspects has been shown to play a significant role in shaping membership decisions among farmers (Fielke & Bardsley 2014). Altogether, these psychological dimensions complement the structural factors outlined above and deepen the explanation of cooperative membership intentions.

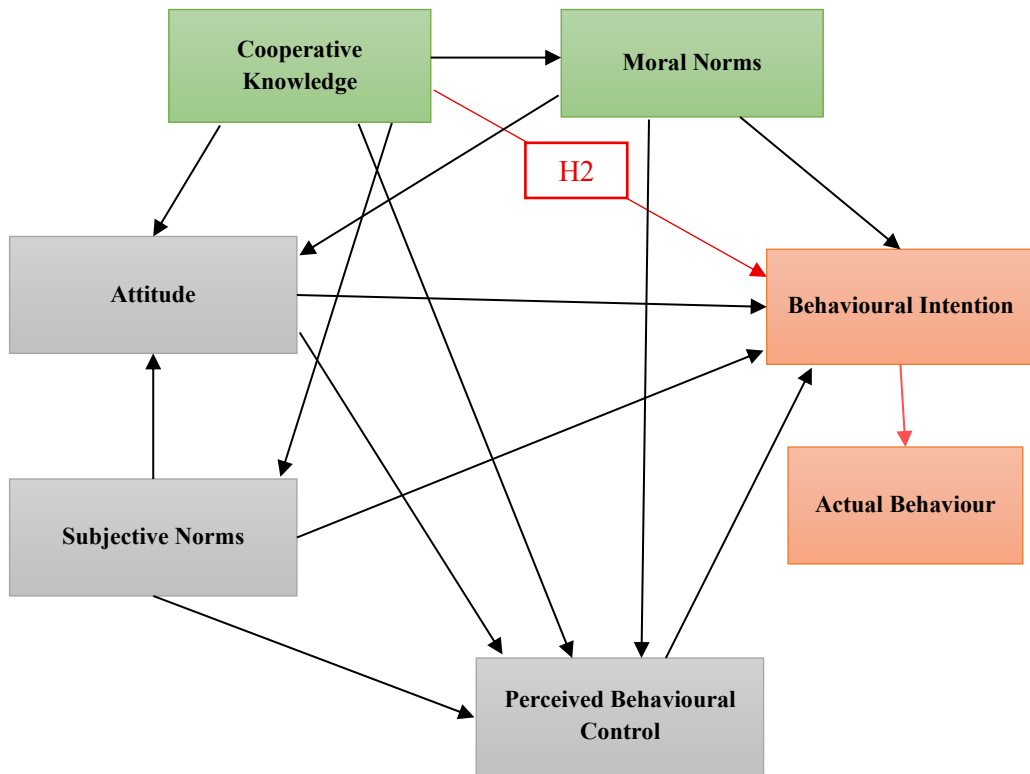


Figure 11. Proposed extension of the TPB model

Figure highlights additional constructs (shown in green). H2 represents second hypothesis of the study.

Figure 11 presents the proposed extension to the TPB model used in this study. In Kenya, two additional constructs, moral norms and knowledge about cooperatives, were incorporated into the standard TPB framework (attitudes, subjective norms, and perceived behavioural control). The moral norms construct was included to address ethical obligations and collective responsibility. This construct was added as it was culturally relevant during the initial survey process carried out in Kenya. The knowledge construct was also included to capture information asymmetry, since it is very important for farmers' decision-making in Kenya's cashew industry. These extensions aligned with Ajzen (2011) recommendation to adapt TPB to context-specific behavioural drivers while maintaining theoretical coherence.

In Nigeria, the extended TPB model retained only knowledge as an additional construct. The refinement was based on these two key findings. Firstly, pilot testing revealed that moral norms had weak factor loadings (<0.70) as well as low reliability (Cronbach's $\alpha = 0.58$). These indicators failed to meet recommended psychometric

thresholds during our confirmatory factor analysis. Secondly, the field observations indicated that Nigerian farmers prioritise market rationality over moral considerations when evaluating the decision to become a member of a cooperative. Hence, by excluding moral norms, the model improved its overall fitness while preserving knowledge to address information gaps critical in export-oriented value chains.

Table 4 summarises each construct, key dimensions framing each question, corresponding evidence from literature, and supporting literature sources.

Table 4. Construct with key dimensions, corresponding evidence from literature, and supporting literature sources

Construct	Key dimensions for statement development	Opinion from literature	Literature sources
Attitude (farmers' positive/negative evaluations of joining cooperatives)	Better prices	Farmers perceive cooperative membership as a means to secure better prices through collective sales.	(Fischer & Qaim 2012; Getnet et al. 2018; Han & Sun 2024)
	Market access	Attitudes are shaped by perceptions that cooperatives help access larger, more profitable markets.	(Verhofstadt & Maertens 2014; Abate 2018; Han & Sun 2024)
	Market information and pricing	Farmers view cooperatives as key sources of market information, enabling better pricing strategies.	(Fischer & Qaim 2012; Abad et al. 2020; Han & Sun 2024)
	Income stability	Positive attitudes develop when cooperatives are seen as providing consistent income through collective bargaining.	(Twumasi et al. 2021; Kalogiannidis et al. 2024)
	Income growth	Attitudes are positively influenced by long-term income growth through cooperative value chain activities.	(Mwangi et al. 2013; Christian et al. 2024)
Intention (commitment to participate, willingness to join, and long-term engagement)	Learning and capacity building	Intentions to join are influenced by opportunities for skill-building and agricultural training provided by cooperatives.	(Fielke & Bardsley 2014; Verhees et al. 2015; Muke et al. 2024)
	Economic benefit	Farmers join cooperatives primarily due to expected economic gains, such as higher profits from collective bargaining.	(Fischer & Qaim 2012; Blekking et al. 2021; Lei et al. 2024)
	Social capital and networking	Farmers join cooperatives to establish networks, share knowledge, and gain peer support within their farming community.	(Mojo et al. 2017; Ofolsha et al. 2022)
Knowledge (awareness and understanding of cooperative operations and benefits)	Cooperative functioning	Farmers with knowledge of cooperative operations and governance structures are more likely to join.	(Bhuyan 2007; Österberg & Nilsson 2009)
	Governance	Understanding cooperative leadership, voting rights and member roles increases participation likelihood.	(Reynolds 1997; L. Park et al. 2023; Liu et al. 2024)
	Membership benefits	Knowledge of benefits such as group bargaining power and shared profits encourages participation.	(Fischer & Qaim 2012; Blekking et al. 2021; Lei et al. 2024)
	Market opportunities	Farmers who are aware of cooperative-enabled market opportunities are more willing to join.	(Markelova & Mwangi 2010; Shiferaw et al. 2011)
	Risks and challenges awareness	Farmers' understanding of cooperative risks (e.g., membership fees, shared liabilities) influences their decision to join.	(Balgah 2019; Muke et al. 2024)

Perceived Behavioural Control (PBC) (farmers' perceived ability to join and participate in cooperatives)	Control over resources	Farmers with access to resources (e.g., land, livestock holdings) perceive fewer barriers to cooperative membership. (Francesconi & Heerink 2011; Abebaw & Haile 2013; Mojo et al. 2015)	
	Time availability	Availability of time to attend meetings and participate in activities increases perceived behavioural control. (Fischer & Qaim 2014; Mwambi et al. 2020; Zheng et al. 2023)	
	Ability to engage in activities	Confidence in managing cooperative activities, such as group farming or marketing, enhances perceived control. (Cechin et al. 2013; Verhees et al. 2015)	
Subjective Norms (influence of social pressure on farmers' decisions)	Peer recommendations	Farmers are more likely to adopt a behaviour when their peers share positive experiences and endorse its benefits. (Bao et al. 2022; Skevas et al. 2022; Moritz et al. 2023)	
	Social pressure/ community influence	Community norms and expectations significantly influence farmers' decisions to adopt a behaviour (Dessart et al. 2019; Qiu et al. 2021; Zhang et al. 2024)	
	Family encouragement	Family support, particularly from spouses and parents, significantly fosters farmers' engagement in certain behaviours (Möllers et al. 2018; Abad et al. 2020; Xu et al. 2021)	
	Important opinion of others	The opinions of respected community leaders or agricultural advisors strongly influence farmers' decisions to perform a behaviour. (Skaalsveen et al. 2020; Chavula et al. 2022)	
Moral Norms (farmers' sense of ethical obligation or responsibility regarding cooperative membership)	Ethical obligation to community	Farmers feel a moral duty to support community development by participating in cooperatives (Lynne et al. 1995; Martínez-García et al. 2013)	
	Responsibility towards peers	A sense of responsibility to fellow farmers motivates participation in collective actions like cooperatives. (Martínez-García et al. 2013; Nkurunziza & Habimana 2021)	
	Perceived moral correctness	Farmers believe that joining cooperatives is morally right because it promotes fairness and collective well-being (Han & Sun 2024)	

Agricultural information sources, whether bonding (e.g., family members, friends, neighbouring farmers) or bridging (e.g., private/public extension officers, input dealers, cooperatives), shape cooperative membership intention in fairly direct ways. Farmers who access reliable and timely information from reliable sources, such as agricultural experts, are more likely to perceive cooperatives as beneficial and may intend to join them (Verhofstadt & Maertens 2014, 2015). Informal channels, for instance, family members or friends, while less structured may facilitate decision-making by providing social validation and first-hand experiences (Zamasiya et al. 2017).

Gendered communication preferences further add complexity to agricultural cooperative membership intention, extending far beyond individual choices to reflect deeply embedded social structures. According to literature, the preference of female farmers' for informal, in-person, relational delivery channels which is rooted in traditional knowledge-exchange systems, often emerges from intersecting structural barriers: digital exclusion (women are less likely to own smartphones in rural Africa, Zougmore & Partey (2022)), technological skill gaps from educational disparities, and time poverty due to disproportionate care responsibilities (averaging 4.1 daily hours versus men's 1.7, FAO 2023). As Fletschner & Mesbah (2011) highlighted, these constraints restrict the access of women to other networks aside bonding social capital, where new ideas and technology circulates more slowly, creating "participatory captivity" that limits their market access. On the other hand, male farmers' predominantly use digital platforms for efficiency purposes, as reported by Zougmore & Partey (2022) in West African cashew sectors, enables engagement with bridging capital through agricultural apps and online marketplaces, accelerating price discovery and input access by 3-5 days.

These different ways of communicating create participatory asymmetries that systematically put women at a disadvantage in three important areas. First, informational marginalization occurs when female farmers depend on hyperlocal networks, which slows down the flow of important information about export standards and price changes. According to Coleman & Mwangi (2013), this information asymmetry reduces bargaining power during negotiations. Secondly, the potential exclusion of women farmers when physical and online meetings (evening Zoom calls, WhatsApp polls) conflict with their care schedules, diminishing voting participation by 40-65% in mixed-gender cooperatives (Farnworth et al. 2013). Thirdly, traditional knowledge shared through women's relational networks is often dismissed against "hard data" from male-dominated digital platforms which weakens their decision-making legitimacy (Bezner Kerr et al. 2019). Hence, as Agarwal (2010) highlighted, women will only maintain the role of a "functional participant" rather than transformative agents in cooperatives, that is, being physically present but strategically marginalised in pricing committees and leadership roles despite contributing 60-80% of agricultural labour (World Bank 2020).

3.4. Kenya and Nigeria as Case Studies

The framework treats Kenya and Nigeria as two separate case studies, with each one used to surface a different set of insights into what determines cooperative membership among cashew farmers. Data are analysed independently for each case study (country). The purpose is to avoid a direct comparison and to keep the focus on

the dynamics that are specific to each setting. This method of data analysis allows for keeping the results anchored in local agricultural systems, as well as the relevant institutional, socio-cultural, and policy contexts, to ensure actionable and adaptable recommendations for stakeholders in both regions

4. Methods

This chapter covers the methodological approach for examining cashew farmers' participation in agricultural cooperatives in both Kenya and Nigeria. While the conceptual framework and analytical methods are somewhat similar across both cases studies, this chapter also makes clear how they were applied in practice within each country. In particular, it details out how data sampling and collection occurred in the two settings, noting the minor adaptations made to sampling procedures where they were necessary, and explaining why those adjustments were justified.

4.1. Study Area

This study was carried out in the primary cashew-producing regions of Kenya and Nigeria. In particular, the coastal counties of Kilifi, Lamu, and Kwale in Kenya and the Southwest zone of Nigeria, specifically, Oyo, Ekiti, Ondo and Osun State. These areas represent the core areas of cashew production in this respective countries. The coastal regions in Kenya (approximately 5% of Kenya's total population) are characterised by a tropical climate with well-distributed rainfall and are highly significant for cashew, producing 8,769 tonnes in 2021 (Agriculture and Food Authority 2022). This constituted 96.14% of Kenya's total cashew production during the 2020-2021 cycle (Agriculture and Food Authority 2022).

The Southwest region of Nigeria has a population of 47 million (22% of Nigeria's total population), featuring a Tropical wet and dry climate experiencing moderate to high annual rainfall with a bimodal pattern (rainy season: March/April-October; dry season: November-February/March). The prevalent tropical and well-drained loamy soils, combined with the seasonal rainfall, make this zone highly suitable for cashew (FAO 2021). Annually, this region produces about 8,000-9,000 tonnes of cashew nuts, representing 40.2% of Nigeria's 2020-2021 production cycle (FAO 2021). Ondo State is noted as a particularly prominent centre for cashew cultivation within Southwest Nigeria due to its favourable agroecological conditions. Figure 12 and Figure 13 display the respective study area maps for Kenya and Nigeria, respectively.

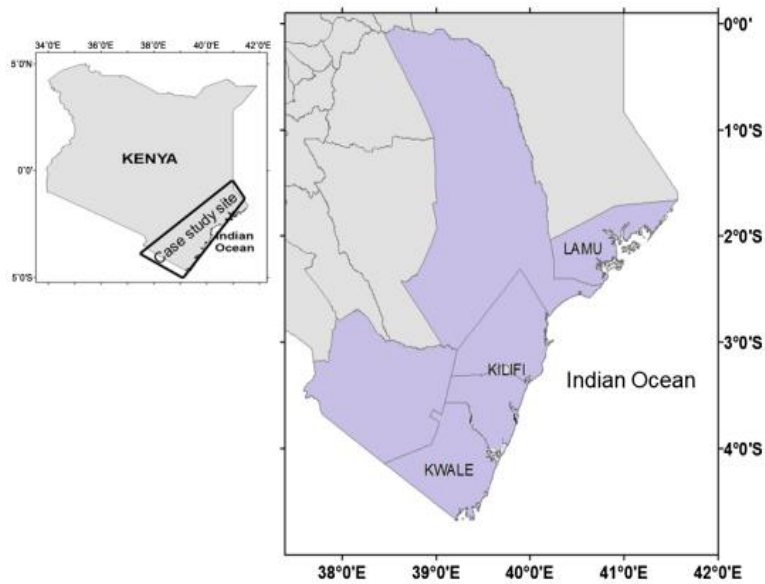


Figure 12. Map of Kenya showing the study area

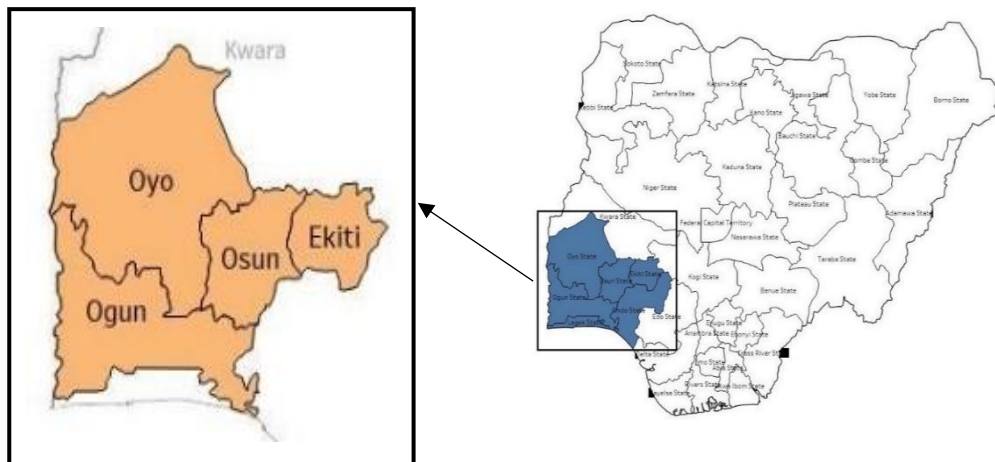


Figure 13. Map of Nigeria showing the southwest region

4.2. Data Collection and Sample Size

This study employed structured questionnaires to collect data from cashew farmers in both Kenya and Nigeria, using Computer-Assisted Personal Interviewing (CAPI) in Kenya between July 2021 and April 2022 and paper-based surveys in Nigeria from April to July 2024. In Kenya, 279 cashew farmers were randomly selected from lists obtained from active traders across the study area (Kwale, Kilifi, and Lamu), yielding 249 valid responses after data cleaning. Similarly, Nigeria's study purposively selected four major cashew-producing states (Oyo, Ekiti, Ondo, and Osun), where 491 cashew farmers were interviewed through a combination of random sampling, the list obtained from the Tree Crop Units (TCU) in the State Ministry of Agriculture and snowball sampling to ensure diverse representation, resulting in 321 valid responses after data cleaning exercise.

Table 5 and Table 6 present the geographic distribution of survey respondents, stratified by county/state and sampling locations.

Table 5. Distribution of population and sampled respondents in Kenya (n = 249)

S/N	County	Total respondents	Locations
1	Kwale	155	Mshiu; Kwale kidimu; Kwale; Majimboni; Kinondo; Mwaluvanga; Dzombo; Kikoneni; Msambweni; Mvinden; Nthenya mbithi; Perani; Lungalunga
2	Kilifi	30	Soko; Kakuyuni; Kibarani; Konjora; Kibokoni; Bahari; Kilimani
3	Lamu	64	Witu mavuno; Hongwe; Bahari; Central; Mapenya; Amkeni; Mavuno; Jericho; Lumshi; Kilimani; Ziwani; Pangani; Mirunji; Kihongwe; Nairobi area; Muungano bahari; Tewe no; Tewe - bahari; Mkunumbi; Kihongwe bahari; Lumshi; Ngoi bahari

Table 6. Distribution of population and sampled respondents in Nigeria (n = 321)

S/N	State	Total respondents	Locations
1	Osun	73	Eketa; Ata Oja; Gidigbo; Oke-Oba; Molete; Oke-Adan
2	Oyo	91	Gambari; Iwofin; Offa-Igbo; Lagun; Sagbe; Eruwa; Lanlate; Igangan; Tapa
3	Ogun	93	Ijebu-Igbo; Isaga Orile; Iwoye-Ketu; Olorunda; Idi Ayin; Ajegunle; Idiroko
4	Ekiti	64	Ayegbaju; Ayede North; Ayede North Itaji; Ilupeju; Ijero ward; Ipoti ward

Before commencing data collection in both countries, a pilot survey was conducted with a small group of farmers to address possible limitations associated with using a structured questionnaire for comprehensive data collection. This process involved 12 and 19 farmers in Kenya and Nigeria, respectively. Identified flaws were carefully considered, with modifications made in the questionnaire design. Enumerators for data collection assisted in gathering information from cashew farmers by filling out questionnaires. Participants were verbally informed about the research, including data anonymisation, aggregation, storage, and use details, ensuring they fully understood the research purpose and their rights. This verbal approach was critical to accommodate participants with low literacy levels, thereby maintaining an inclusive and equitable process for all involved. Of note, all respondents involved in this study were current non-members of formal cashew cooperatives, reflecting the emerging market context. Survey respondents were screened to be cashew farmers who were not currently members of a cashew marketing cooperative (or at least, not a formal cashew cooperative), although a minority of the respondents held memberships in unrelated cooperative forms (notably SACCOs in Kenya and thrift/credit cooperatives in Nigeria). The intention construct therefore captures prospective rather than realised membership in the specific cooperative form under study.

A major aspect of the thesis focus was to examine farmers' intention to join cashew cooperatives. Hence, the sample size determination of the study was conducted using the following equation (1), which is commonly employed for SEM:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \cdot 2 \cdot \sigma^2}{(X_1 - X_2)^2} \quad (1)$$

Where,

$Z_{\alpha/2}$ is the Z-score corresponding to the desired significance level ($\alpha = 0.05$), typically 1.96.

Z_{β} is the Z-score corresponding to the desired power level ($\beta = 0.2$, for power = 0.8), typically 0.84.

σ^2 is the variance of the population.

$X_1 - X_2$ is the anticipated effect size.

For this specific context, the calculation simplifies using Cohen's standardised effect size (d) for the SEM, which incorporates these elements into the effect size directly. Hence, equation (2) is as follows:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2}{(d)^2} \quad (2)$$

Where the anticipated effect size is 0.3, the desired statistical power ($1 - \beta$) is 0.8, the number of latent variables is 6 and 5 for Kenya and Nigeria, respectively. The number of observed variables is 20 and 21 for Kenya and Nigeria, respectively.

The significance level (α) is 0.05. The calculation results in a minimum required sample size of approximately 161 and 150 participants for Kenya and Nigeria, respectively.

The study employed a combined questionnaire to tackle two key research objectives: examining farmers' intention to participate in cooperatives and analysing farmers' social capital, including sources and delivery channels of information, in agricultural contexts. The questionnaire administered was structured into three main sections. The first section covered farmer, farm and household information such as age, gender, residence, education, income source, household size, farm size, farm experience, and the number of cashew trees farmers have. Secondly, social capital information regarding farmers' most used agricultural information source, and the most used way of seeking advice (delivery channel) from identified information sources. Lastly, Likert-type scale questions ranging from "completely disagree" (1) to "completely agree" (5) to evaluate variables related to attitudes, perceived behavioural control, subjective norms, knowledge, moral norms (in Kenya) and intention. This study anchors its measurement items on previous literature that explored farmers' intention to adopt a behaviour (Bagheri et al. 2019; Maleksaeidi & Keshavarz 2019; Govindharaj et al. 2021; Dong et al. 2023).

Specifically, the attitude-related statements in this study, focusing on the farmers' positive or negative assessment of joining a cooperative, such as the belief that membership in cooperatives enhances market access and income, are supported by empirical findings that highlight cooperatives' role in improving farmers economic prospects (Fischer & Qaim 2012; Verhofstadt & Maertens 2014; Abate 2018; Getnet et al. 2018; Han & Sun 2024). The subjective norms-related statements reflect the perception of social pressure (for instance, from family members and peers) to join or not join a cooperative. This concept is validated by studies that emphasise the social embeddedness of agricultural decision-making (Möllers et al. 2018; Dessart et al. 2019; Skaalsveen et al. 2020; Bao et al. 2022; Chavula et al. 2022; Skevas et al. 2022; Zhang et al. 2024). Perceived behavioural control statements were modelled on previous studies that assess farmers' confidence in overcoming institutional and financial barriers to cooperative membership (Francesconi & Heerink 2011; Abebaw & Haile 2013; Cechin et al. 2013; Kolade et al. 2014; Mojo et al. 2015; Maichum et al. 2016; Mwambi et al. 2020). Additionally, knowledge and moral norms as explanatory variables have been incorporated into extended TPB models. The knowledge variable assesses farmers' familiarity with cooperative benefits, governance structures, and expected outcomes (Reynolds 1997; Bhuyan 2007; Österberg & Nilsson 2009; Markelova & Mwangi 2010; Shiferaw et al. 2011; Blekking et al. 2021; L. Park et al. 2023; Liu et al. 2024). The moral norm variable relates to farmers' internalised values that guide their sense of ethical responsibility, significantly impacting decision-making (Kaiser and Scheuthle 2003; Govindharaj et

al. 2021). Table 7 displays the statements (questions framed) for each construct. Improvements to the survey questions carried out in Kenya were made based on the lessons learned from the Kenya fieldwork, which took place earlier. While retaining identical construct domains and measurement scales, specific item wording was refined for the Nigeria study to enhance contextual clarity and conceptual precision. These adaptations, developed through pilot testing, cognitive interviews, and analysis of Kenyan response patterns, helped to strengthen the validity of the model without compromising theoretical consistency across both studies.

The constructs influencing farmers intention to join cooperatives is analysed using a covariance-based structural equation modelling (CB-SEM) with the Maximum Likelihood Robust (MLR) estimator in the *lavaan* package (Rosseel 2012) in R. To ensure robustness in the study's findings and assess the stability of the initial results from CB-SEM, the model was re-estimated using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS (Hair et al. 2019).

Table 7. Construct codes and statements

Construct Codes	Statements	
	Kenya	Nigeria
Attitudes towards cashew marketing cooperatives		
ATT_1	If I join a cashew marketing cooperative, I will have better opportunities to market my products for a better price (guarantee of sales)	I believe that joining a cashew cooperative is an effective way to get better prices for my produce through collective bargaining
ATT_2	If I join a cashew marketing cooperative, I will have better contacts with other farmers in the group who can help me if I need	I believe that being a member of a cashew cooperative will expand my market access and create more selling opportunities
ATT_3	If I join a cashew marketing cooperative, my access to information, training and input will increase	I think that joining a cooperative will provide access to market information, which will help me sell my cashews more profitably
ATT_4	If I join a cashew marketing cooperative, I will be able to contribute to the growth of the local cashew industry	I believe that being a part of a cashew cooperative will help me stabilise my income through collective sales and price negotiations
ATT_5		I believe that cooperative membership will improve my long-term earnings and provide financial security
Intention to join cashew marketing cooperatives		
INT_1	I will join the cooperative as soon as possible to maximise my income	I will join a cashew cooperative to gain access to training and knowledge-sharing opportunities
INT_2	I will join the cooperative and be an active member of the cooperative	I will join a cashew cooperative to benefit from shared resources and collective bargaining power
INT_3	I will join the cooperative and become a member of the board (leadership position)	I will join a cashew cooperative to become an active to strengthen my network with other farmers and gain better support
Subjective norms related to cooperative membership		
SUB_NORM_1	My family encourages me to join a cashew marketing cooperative, and their opinion matters to me	My friends have a positive feeling towards cooperatives and encourage me to join a cooperative too
SUB_NORM_2	My friends encourage me to join a cashew marketing cooperative and are positive about joining cashew marketing cooperative	Some farmers in my community are part of a cooperative, and I feel I should join as well
SUB_NORM_3	Agricultural experts/officers recommend joining a cashew marketing cooperative	My family believes that joining a cooperative is a good decision and supports me in becoming a member
SUB_NORM_4		I feel pressure from other farmers to join a cooperative because it is seen as a common practice in my area

SUB_NORM_5	Agricultural experts have encouraged me to join cooperatives, and I think I should become a member	
Perceived behavioural control over cooperative membership		
PBC_1	The fees and requirements for cooperative membership are reasonable for me.	I feel confident that I have the necessary resources (e.g., membership fee) to participate in a cashew cooperative
PBC_2	Nothing prevents me from joining the cooperative; I can easily meet the necessary criteria	Joining a cooperative is within my control, and I can commit my time and effort to it
PBC_3	I have ideal resources for joining the cooperative, and I am aware of the steps required to join	I am confident that I can contribute meaningfully to cooperative activities, such as group farming or collective marketing
PBC_4	Choosing to join the cooperative is solely dependent on me, as I can balance cooperative activities with my farming schedules	
Moral norms related to cooperative membership		
MORAL_NO_RM_1	I would feel guilty if I did not explore the option of cooperative membership.	
MORAL_NO_RM_2	I believe that cooperating with other cashew farmers is both legally and morally acceptable.	
MORAL_NO_RM_3	I feel a sense of duty to contribute to the growth of the local cashew industry through cooperative participation.	
MORAL_NO_RM_4	I would feel a sense of responsibility towards fellow cashew farmers by joining a cooperative.	
Knowledge about cashew marketing cooperatives		
KNOWLEDG_E_1	I have a complete understanding of the benefits and challenges of becoming a member of a cashew marketing group	I understand how cashew cooperatives operate and how they support their members
KNOWLEDG_E_2	I have a complete understanding of the functioning of cooperatives	I am familiar with the leadership structure and decision-making processes within cooperatives
KNOWLEDG_E_3		I have a clear understanding of the benefits that cooperative membership can provide, such as better prices and access to markets
KNOWLEDG_E_4		I am aware of the marketing opportunities and collective bargaining advantages offered by cooperatives
KNOWLEDG_E_5		I know the potential challenges and risks involved in joining a cashew cooperative

To understand farmers' means of information acquisition, survey data from cashew farmers were categorised based on the types of social capital, that is, bonding and bridging. In terms of farmers' information delivery channel, this variable was captured in terms of farmers' most used channel of communicating with their most used agricultural advisory sources, such as face-to-face, telephone, social media, farmer events, training and farm visits, and others (such as radio programs, agricultural TV shows). These channels of delivery are further grouped into formal and informal channels.

4.3. Empirical Analysis

This research employs complementary analytical approaches, a probit regression and CB-SEM, to examine distinct dimensions of cooperative membership intention from both farm and household as well as psychological perspectives. The dual analytical approach is methodologically grounded in the distinct nature of the variables under investigation. The CB-SEM is particularly helpful for analysing complex relationships in observed (that is, measurable) variables and latent (that is, unmeasurable) variables. In this research, farmers' intentions to join cashew cooperatives is influenced by both farm and household characteristics (such as age, gender, education, farm size) and psychological variables (such as attitude, subjective norms, perceived behavioural control) which are not directly measurable. The CB-SEM is well positioned to model these type of complex relationships (Hair et al. 2019). Of note, the CB-SEM is theoretically inappropriate for socioeconomic/demographic variables (for instance, age, education, gender, farm size) due to three inherent constraints:

- 1) Socioeconomic/demographic characteristics typically function as single-item variables that violate PLS-SEM's requirement for multi-item latent constructs (Sarstedt et al. 2016);
- 2) the algorithm struggles with categorical predictors and assumes linear relationships (Hair et al. 2017); and,
- 3) these variables often introduce endogeneity bias when forced into structural paths (Antonakis et al. 2010).

Hence, probit regression was adopted to robustly model direct effects of observable factors (that is, farm, household, social capital variables) on membership intention, while the CB-SEM was exclusively selected to analyse the psychological pathways through intention formation. This methodological approach helps to enhance the study's validity through complementary analytical strengths (Johnson & Onwuegbuzie 2004), by ensuring a comprehensive examination of both observable and latent drivers of cooperative membership and intention behaviour.

Additionally, chi-square tests were employed to specifically assess the associations between categorical variables of information access and delivery channels of information among farmers.

4.3.1. **Probit Regression Model (Farm, Household, Social Capital and Communication Determinants of Cooperative Membership Intention)**

Given the absence of established formal cashew cooperatives in the study area, this study examined farmers' commitment to future membership as a proxy for behavioural adoption. We operationalise the intention to join through a binary variable derived from intention strength. This approach reflected farmers' intention or readiness to join when cooperatives are operationalised.

The intention of cashew farmers to join a cooperative was modelled using the framework of random utility theory, which assumes that a farmer's intention to participate in a cooperative is driven by the perceived utility associated with that decision. Given the generally risk-averse nature of farmers, their decision-making process is influenced by the perceived benefits of cooperative membership.

The perceived benefits of joining a cooperative can be represented as a latent variable D_j^* , which reflects the unobservable utility a farmer associates with membership. This latent variable is modelled as a function of observable characteristics and attributes, represented by Z , as described in the following latent variable equation (3):

$$D_j^* = Z_j\gamma + \varepsilon_j; D_j = 1 \text{ if } D_j^* > 0; D_j = 0 \text{ if } D_j^* \leq 0 \quad (3)$$

In this framework, D_j^* is a binary variable that equals 1 if a farmer intends to become a cooperative member and 0 if they do not. γ represents the estimated parameters, ε is the error term with a mean of zero, and Z captures the factors influencing farmers' intention to join cooperatives.

The dependent variable for the probit regression model was operationalised as a binary outcome (intention to join a cooperative for 1; no intention to join for 0). This was derived through a two-step process. First, we calculated the mean score of three Likert-scale items measuring intention to join (each rated 1-5, where 1 = strongly disagree and 5 = strongly agree), with scores below 2.5 classified as "no intention to join cooperative" and scores ≥ 2.5 as "intention to join cooperative". Second, we cross-validated this with farmers' direct responses to a yes/no question about cooperative membership. In cases of discrepancy (for instance, a farmer reporting "yes" but having an average intention score < 2.5), the intention scale score was used as the primary indicator, as it provided a more comprehensive and reliable assessment of intention, based on multiple measurement items rather than a single response. This approach aligns with established methods for dichotomising continuous psychological

measures (Cohen 1983; MacCallum et al. 2002). This binary choice model was estimated using the probit regression model.

Following the convention in the smallholder cooperative-membership literature Wollni & Zeller (2007); Mojo et al. (2017) and Mwambi et al. (2020), the umbrella term “farmer, farm and household characteristics” is used in this thesis to denote the joint set of (i) socio-demographic variables of the household head (age, gender, length of residence), (ii) human-capital variables (education) and household-economic variables (main income source from cashew), and (iii) farm-level production variables (farm size, number of cashew trees, hired labour, land ownership status). The probit model therefore includes independent variables drawn from these three blocks. In addition to these blocks, social capital type is operationalised through farmers’ most used information source, distinguishing bonding from bridging ties.

Of note, farmers’ highest level of education, as an explanatory variable, required specific treatment to comply with the standard probit assumptions for categorical predictors. The education variable was primarily captured as four categories (no formal, primary, secondary, tertiary). Since category codes do not represent a continuous quantity, education was entered into probit as three indicator variables (primary, secondary, tertiary) with no formal education as the omitted reference category. This follows the standard practice for nominal and ordered-categorical predictors in discrete-choice models (Wooldridge 2010; Greene 2018). Each estimated coefficient therefore captures the change in the probability of intention relative to a farmer with no formal education, holding all other variables at their means.

Farmers information sources is operationalised through farmers’ most used source of information, distinguishing formal from informal sources. These dimensions are captured based on Putnam (2000) foundational framework of social capital dimensions:

Bonding social capital: Operationalised through information from neighbouring farmers, family members, and friends. This aligns with Woolcock (2001) conceptualisation of bonding ties as strong connections between similar individuals that provide emotional support and resource sharing (Pretty & Ward 2001).

Bridging social capital: Measured through connections with public extension workers, private experts/officers, private extension workers, input dealers and cooperative officials. This reflects Granovetter (1973) “strength of weak ties” theory and subsequent agricultural adaptations by Uphoff (1999), where horizontal networks across diverse groups facilitate information diffusion. Also, this follows Szreter & Woolcock (2004) definition of vertical connections to formal institutions that enable access to resources and power structures.

This dual classification has been empirically validated in agricultural settings by Grootaert et al. (2004) in World Bank studies on rural development; Pretty & Ward (2001) in farming community analyses; and Matuschke & Qaim (2009) specifically for agricultural innovation adoption.

Hence, bonding social capital included family, friends, and neighbours; while bridging social capital included extension officers, experts, cooperative officials and input dealers. This categorization helped to examine how these two different network types affect cooperative participation intentions among cashew farmers.

The operationalization of information delivery channels into formal and informal dimensions is grounded in a well-established distinction within agricultural extension and communication literature. Rogers (2003) was among the first to draw a clear line between formal channels, which are institutionally organized and expert-driven modes of dissemination such as training sessions, field days, and farmer events, and informal channels, which refer to interpersonal and socially embedded communication modes including face-to-face interaction, telephone conversations, and broadcast media like radio and agricultural television programs. This distinction has since been widely adopted. Anderson and Feder (2007) and Birner et al. (2009) both drew on it in their empirical work examining how farmers access agricultural information and respond to it. Aker (2011) similarly treated mobile phone-based and peer-to-peer communication as informal channels, setting them apart from organized extension services. Tadesse and Bahiigwa (2015) followed a comparable approach in their study of Ethiopian farmers. More broadly, Spielman et al. (2012) showed that formal institutional channels and informal social networks serve complementary but analytically distinct roles in shaping farmers' behavioural decisions.

This present study treats formal channels (trainings and organized farmer events) and informal channels (face-to-face interaction, telephone use, and broadcast media) as separate binary indicators. Formal channels were retained as the reference category in the regression model. This choice serves two purposes. Firstly, it allows for a meaningful interpretation of how informal channels influence cooperative participation intention relative to formal ones. Secondly, it avoids multicollinearity that would arise from including all channel dummies simultaneously, which is standard practice in logistic regression modelling (Hosmer & Lemeshow, 2000).

4.3.2. Structural Equation Modelling (SEM) (Psychological Variables for Cooperative Membership)

The CB-SEM allows for analysing complex relationships between observed (measurable) variables and latent (unobserved) variables. For this aspect of the study, farmers' intentions to join cashew marketing cooperatives are influenced by

psychological variables such as their attitude towards cashew cooperatives, subjective norms related to cooperative membership, perceived behavioural control over membership, moral norms related to cooperative membership, and knowledge about cashew cooperatives (Lalani et al. 2016; Adnan et al. 2018; Maleksaeidi and Keshavarz 2019), which are not directly measurable. The CB-SEM in this study helps to model the intricate relationships effectively. Here, the study employed the MLR estimator in the *lavaan* package (Rosseel 2012) in R. While the primary data analysis for this research was carried out in R, a mathematical programming software, the MLR estimator (also known as the Satorra-Bentler rescaling method) was employed since our data violated assumptions of multivariate normality (Mardia's test, $p < 0.05$) and univariate normality (Shapiro-Wilk tests, all $p < 0.05$), as detailed in Section 4.3.2.1 (Normality Check). The MLR estimator provides robust standard errors and a scaled test statistic that is appropriate for non-normal data.

Furthermore, in order to ensure robustness of the initial results from CB-SEM and to assess the stability of the study's findings, the model was re-estimated using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS (Hair et al. 2019). SmartPLS is preferred as the favoured analytical tool due to its adaptability to handle a variety of data attributes and model complexity that are common in exploratory research (Hair et al. 2019). Of note, PLS-SEM is a non-parametric approach that does not rely on distributional assumptions and can handle complex models with smaller sample sizes and particularly suitable as a robustness check as it estimates parameters by maximising the explained variance of endogenous constructs which offers a complementary perspective to the covariance-based approach. Unlike IBM SPSS AMOS, which is more suitable and adaptable for large sample sizes and data that meet normal distribution assumptions, SmartPLS is robust to violations of normality and can perform effectively with smaller sample sizes. As Hair et al. (2019) suggest, PLS-SEM is especially helpful when the structural model is complex and involves many constructs, indicators, and relationships. Given these factors, SmartPLS is suitable for this study as the study seeks to explore theoretical extensions while aiming to manage the challenges with data distribution. The methodological choice ensures the model can be estimated effectively and reliably which aligns with the research objectives. The PLS-SEM results are presented in a separate section in the results section (Section 4.0) and are used to confirm the consistency of the path coefficients obtained from the main CB-SEM analysis.

4.3.2.1. Normality Check

Before carrying out the measurement model, specifically the confirmatory factor analysis (CFA) model, measurement item normality was assessed through multivariate and univariate normality tests. The normality of data holds vital

significance, given that the estimation method employed in CFA and SEM relies on data normality. The Mardia test reveals a p-value below 0.05 (see Appendix A and F for Kenya and Nigeria, respectively), which negates the null hypothesis of multivariate normality. Similarly, the Shapiro-Wilk test, with all p-values below 0.05 for all measurement items, negates the null hypothesis of univariate normality. Consequently, we opt for the Maximum Likelihood Robust (MLR) estimator (also known as the Satorra-Bentler rescaling method) to conduct the estimation of the measurement model, as opposed to the maximum likelihood (ML) estimator, following Rosseel (2012).

4.3.2.2. Measurement Model Evaluation (CB-SEM)

The foundation for CB-SEM necessitates establishing a measurement model, connecting measurement items with their associated latent variables. This section introduces the statistical procedures employed to ascertain the measurement model's validity and reliability. To conduct this analysis, we employ the *lavaan* package in R, as Rosseel (2012) highlighted and recently adopted by Munim and Noor (2020). The extended TPB model comprises six and five latent variables for Kenya and Nigeria, respectively, each possessing unique characteristics that cannot be effectively captured with a single observed variable. Consequently, we used multiple observed items to assess the distinct latent variables within the conceptual model.

Inspiration for constructing the measurement scales for all latent variables was derived from authors who previously analysed farmers' behaviour and intention towards a particular service or good (Bagheri et al. 2019; Maleksaeidi and Keshavarz 2019; Munim and Noor 2020; Govindharaj et al. 2021). The measurement items under each construct were refined from extensive discussions during the pilot study. Following the exploratory factor analysis conducted using R (see Appendix B and G), some measurement indicators were excluded from the study due to insufficient factor loadings, specifically those falling below the 0.300 threshold. These adjustments, notwithstanding, align with best practices in scale development, ensuring that each factor is adequately represented by meaningful items, striking a balance between item quantity and quality in the instrument (Raubenheimer 2004; Ho 2006).

The standardised factor loadings from the CFA model are presented in Table 8. All loadings are statistically significant at the 1% level ($p < 0.001$) and exceeded the recommended threshold of 0.6 according to (Hair et al. 2021), confirming the convergent validity of the measurement model (Anderson & Gerbing 1988).

Table 8. Measurement items and their factor loadings

Construct codes	Kenya		Nigeria	
	Mean (std. dev.)	Factor loadings	Mean (std. dev.)	Factor loadings
Construct: Attitude				
ATT_1	3.297 (1.112)	0.813	3.663 (1.042)	0.770
ATT_2	3.647 (1.016)	0.806	3.700 (1.051)	0.740
ATT_3	3.213 (1.119)	0.844	3.293 (1.038)	0.749
ATT_4	3.369 (0.998)	0.815	3.542 (0.942)	0.669
ATT_5			3.436 (1.011)	0.710
Construct: Intention				
INT_1	3.767 (0.995)	0.905	2.988 (0.976)	0.958
INT_2	3.711 (0.998)	0.939	3.336 (1.004)	0.942
INT_3	3.683 (1.006)	0.891	2.854 (1.054)	0.926
Construct: Subjective Norms				
SUB_NORM_1	3.538 (0.961)	0.821	2.988 (1.204)	0.762
SUB_NORM_2	3.502 (0.990)	0.848	3.336 (1.054)	0.812
SUB_NORM_3	3.426 (1.027)	0.769	2.854 (1.280)	0.675
SUB_NORM_4			2.857 (1.039)	0.711
SUB_NORM_5			3.530 (1.181)	0.718
Construct: Perceived Behavioural Control				
PBC_1	3.462 (0.914)	0.884	2.748 (1.251)	0.942
PBC_2	3.622 (0.915)	0.921	2.854 (1.222)	0.935
PBC_3	3.823 (0.928)	0.890	2.832 (1.391)	0.810
PBC_4	3.554 (1.075)	0.812		
Construct: Moral Norms				
MORAL_NORM_1	3.008 (1.202)	0.738		
MORAL_NORM_2	3.325 (1.043)	0.746		
MORAL_NORM_3	2.839 (1.037)	0.746		
MORAL_NORM_4	3.104 (1.114)	0.769		
Construct: Knowledge about Cooperatives				
KNOWLEDGE_1	3.655 (1.042)	0.899	3.636 (0.881)	0.891
KNOWLEDGE_2	3.683 (1.086)	0.901	3.477 (0.905)	0.863
KNOWLEDGE_3			3.813 (0.906)	0.874
KNOWLEDGE_4			3.551 (1.060)	0.803
KNOWLEDGE_5			3.324 (1.157)	0.637
CFA model-fit: χ^2 (249) = 119.800, CFI = 0.955, TLI = 0.945, RMSEA = 0.048, SRMR = 0.052			CFA model-fit: χ^2 (321) = 299.888.070, CFI = 0.965, TLI = 0.959, RMSEA = 0.05, SRMR = 0.045.	

The mean and standard deviation (Std. Dev) values are based on the arithmetic average of item scores measuring latent variables.

Table 9. Construct reliability and validity (Kenya)

Constructs	Mean (Std. Dev.)	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average Variance Extracted (AVE)
Attitudes	3.382 (0.872)	0.837	0.838	0.891	0.672
Intention	3.720 (0.911)	0.899	0.913	0.937	0.832
Knowledge	3.669 (0.960)	0.765	0.765	0.895	0.810
Moral Norms	3.058 (0.875)	0.744	0.754	0.837	0.563
Perceived Behavioural Control	3.615 (0.841)	0.901	0.920	0.930	0.770
Subjective Norms	3.489 (0.808)	0.742	0.742	0.854	0.661

Table 10. Construct reliability and validity (Nigeria)

Constructs	Mean (Std. Dev.)	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Attitude	3.527 (1.027)	0.779	0.781	0.850	0.531
Intention	3.209 (1.011)	0.936	0.938	0.959	0.887
Knowledge	3.560 (1.000)	0.874	0.897	0.909	0.670
Perceived Behavioural Control	2.811 (1.289)	0.878	0.897	0.925	0.806
Subjective Norms	3.113 (1.186)	0.791	0.804	0.856	0.543

Furthermore, for the reliability of the measurement model, we assessed the Cronbach's alpha (Cronbach 1951), Composite Reliability (CR) and the Average Variance Explained (AVE) for each of the constructs. According to the results in Table 10 and Table 10 for Kenya and Nigeria, respectively, the values of both Cronbach's alpha and CR exceed the recommended threshold of 0.700, as highlighted by Hair et al. (2011). Also, the result shows that the AVE for both case studies exceed the threshold value of 0.500 Hair et al. (2021). Hence, the reliability of the measurement model is established.

As outlined by Hair et al. (2011), the calculation of CR can be accomplished using the following equation (4):

$$CR = \frac{(\sum_{i=1}^n FL_i)^2}{(\sum_{i=1}^n FL_i)^2 + (\sum_{i=1}^n ME_i)} \quad (4)$$

According to equation 4, FL_i represents the standardised factor loadings for measurement item i , while n denotes the total number of items within a factor. Additionally, ME_i , signifying the measurement error for item i , can be computed using the formula: $(\sum 1 - FL_i)^2$.

Discriminant validity was also assessed using the Fornell-Lareker criterion. Discriminant validity checks whether theoretically unrelated constructs exhibit no significant relationships Hair et al. (2021). As presented in Appendix C (for Kenya) and Appendix H (for Nigeria), the diagonal values (square root of AVE) for each construct are Attitude (0.820), Intention (0.912), Knowledge (0.900), Moral Norms (0.750) Perceived Behavioural Control (0.878), and Subjective Norms (0.813) for Kenya, and Attitude (0.729), Intention (0.942), Knowledge (0.819), Perceived Behavioural Control (0.898), and Subjective Norms (0.737) for Nigeria. These diagonal values are all greater than the off-diagonal inter-construct correlations in the same row and column. For example, in Nigeria, the square root of AVE for Attitude (0.729) exceeds its correlations with Intention (0.470), Knowledge (0.226), Perceived Behavioural Control (0.333), and Subjective Norms (0.326). This pattern holds for all constructs as well as the case study in Kenya, confirming that each latent variable shares more variance with its own indicators than with other constructs. Hence, discriminant validity is established (Hair et al. 2010, 2021).

Therefore, the computation of AVE can be executed using the subsequent equation (5):

$$AVE = \frac{(\sum_{i=1}^n FL_i)^2}{n} \quad (5)$$

In the fifth equation, FL_i represents the standardised factor loadings for measurement item i , while n denotes the total number of measurement indicators within a factor. According to Hair et al. (2011), we established that squared correlations below the diagonal are in fact less than the AVE for each latent variable to confirm divergent validity for both case studies.

Having established the measurement model, the summary of the descriptive statistics for our latent variables are presented in Table 8. These values are the mean and standard deviation (std. dev.), calculated as the arithmetic average of the item scores evaluating each latent variable. The correlation matrix below the diagonal values (Appendix D) shows the relationships between our latent variables derived from factor values obtained from the CFA.

4.3.2.3. Common Method Bias

Common method bias typically refers to a systematic error introduced in research work as a result of shared data collection method as against measured constructs. This occurs when the variance in the data is attributed more to the measurement method rather than the constructs themselves. Common method bias usually leads to inflated relationships or correlations between variables, which could potentially influence the accuracy and validity of results. According to Podsakoff et al. (2003), some statistical treatments for common method bias are necessary to validate study's findings. Before data collection, we incorporated several design-based measures as recommended by Podsakoff et al. (2003) to minimise this risk. Firstly, the respondents were assured of complete anonymity to reduce social desirability bias. Secondly, the different Likert-scale anchors were used across construct sections (for example, "completely disagree to completely agree" for all constructs). Thirdly, exogenous variables (that is, attitudes, subjective norms, perceived behavioural control, moral norms and knowledge) were placed on separate pages from the endogenous variable (that is, intention) to create psychological distance. Lastly, reverse-coded items were included to disrupt automatic response patterns.

Furthermore, as a statistical procedure, we adopted Harman's single-factor test. Through unrotated EFA involving the 20 items (in Kenya) and 21 items (in Nigeria) loading on a singular latent factor, the average variance explained by this single factor was only 29% in Kenya and 27% in Nigeria. This value falls substantially below the recommended threshold of 50%, which indicates that no single general factor accounts for most of the covariance among the items. Additionally, an inspection of the correlation matrix (see Appendix C & H for Kenya and Nigeria, respectively) showed that no inter-construct correlation exceeds 0.85, which further suggests that common method bias is unlikely to be a serious concern.

4.3.2.4. Robustness Check: PLS-SEM Measurement Model

Lastly, to ensure the robustness of our measurement model, the model was re-estimated using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS (Hair et al. 2019). In PLS-SEM, the measurement model is evaluated through indicator reliability, internal consistency, convergent validity, and discriminant validity. The model's internal consistency was assessed using composite reliability (CR). According to the results in Table 9 and Table 10, all CR values exceeded the recommended threshold of 0.70, indicating adequate internal consistency for both case studies.

Also, convergent validity was evaluated using the AVE, with all values above 0.50, consistent with the CB-SEM results.

Discriminant validity was also examined using the Heterotrait-Monotrait (HTMT) criterion (Henseler et al. 2015). The HTMT criterion is a recommended method for assessing discriminant validity in PLS-SEM as it outperforms traditional methods. In a Monte Carlo simulation study, Henseler et al. (2015) demonstrated that the HTMT criterion achieves high specificity and sensitivity rates (97–99%), suggesting that it correctly identifies the absence as well as the presence of discriminant validity. In contrast, the cross-loadings criterion had a specificity and sensitivity rate of 0.00%, and the Fornell-Larcker criterion achieved only 20.82%. Based on these findings, HTMT is considered a more reliable test. Common thresholds for HTMT are 0.85 (conservative) and 0.90 (liberal). Values below 0.85 indicate that constructs are empirically distinct from each other (Gold et al. 2001; Kline 2018). As presented in Appendix D and I for Kenya and Nigeria, respectively, all HTMT estimates for the construct pairs range from 0.238 to 0.613 for Kenya, and 0.173 to 0.548 for Nigeria, well below the conservative threshold of 0.85. For example, the highest HTMT value (0.613) occurs between Attitude and Knowledge in the Kenya case study, which is still substantially lower than 0.85. These results confirm that discriminant validity is established. This finding also aligns with the Fornell-Larcker criterion reported in Appendix C and H for Kenya and Nigeria, respectively, where the square root of the AVE for each construct exceeds the inter-construct correlations. Together, both criteria provide strong evidence that the latent variables are conceptually and empirically distinct. Hence, we can confidently affirm discriminant validity of the latent variables.

4.3.3. Chi-Square Test

To investigate the association between the gender of farmers' and their most used information sources and delivery channels, Chi-Square tests of independence was conducted. This bivariate test was carried out to isolate and examine the specific relationship between the gender of the farmer and the most used information source and delivery channels. This focused approach is methodologically justified as it follows a clear examination of whether a fundamental gender divide exists on how farmers most used source of agricultural information and the delivery channel involved in assessing such information. While the probit regression model examined the influence of gender among many other factors on its influence on participation intention among farmers, the Chi-Square analysis asks a more foundational question: do men and women, on the whole, use different ways to get information and communicate? Incorporating other variables here would hide this primary gendered dynamic. The analysis was performed separately for Kenya and Nigeria to account for contextual differences in social capital structures and cooperative dynamics.

The gender of the farmer served as the independent variable, while the most used information sources (bonding and bridging social capital) and delivery channels

(formal and informal channels) were treated as dependent variables. For this analysis, key assumptions for the Chi-Square test were verified, including the independence of observations, ensured by sampling farmers from distinct households, and the requirement of expected frequencies ≥ 5 per cell. Where this assumption was violated, such as in sparse categories like “others”, interpretations were flagged with caution. Contingency tables were constructed for each variable pair (e.g., neighbouring farmers x cooperative membership) to facilitate analysis.

Descriptive statistics are provided prior to the chi-square test results, using bar charts for each information source and delivery channel. Percentages were assessed per group, though the Chi-Square test remained the primary method. For each independent variable, 2×2 (or $n \times k$) contingency tables were generated, and the Pearson Chi-Square statistic (χ^2) was calculated to test independence, with significance thresholds set at $p < 0.1$ (two-tailed). Effect sizes were reported using Phi (ϕ) for 2×2 tables and Cramer’s V for larger tables, interpreted as 0.10 (small), 0.30 (medium), and 0.50 (large).

All analyses were conducted in SPSS (v. 29), with results tabulated to display χ^2 values, degrees of freedom (df), p-values, and effect sizes. Asterisks denote significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4.4. Description of Variables in the Study

The variables in this thesis are organised into four conceptually distinct categories namely: farmer, farm and household characteristics, production and marketing variables, social capital variables (sources and channels), and psychological variables. This thesis uses the term farmer, farm and household characteristics in its standard agricultural economics sense, which encompasses the demographic attributes (such as age, gender, household size, length of residence in community), the farmer’s human capital (education), and the structural and economic attributes of the farm and household (such as farm size, landownership status, number of cashew trees, hired labour and main income source). This compound usage is frequently adopted in cooperative membership and rural development research across SSA where demographic, human capital as well as farm level economic attributes interact closely in shaping farmers’ access to information, resources, and collective action opportunities (Fischer & Qaim 2012; Abebaw & Haile 2013; Mojo et al. 2017). The thesis maintains the taxonomy summarized in Table 11 below, distinguishing demographic characteristics (such as age, gender, household size, length of residence) from farm structural attributes (such as farm size, landownership status, number of cashew trees, hired labour) and from human capital and income variables (such as education, main income source). Social capital type and delivery channel variables,

although included in the probit model alongside farmer, farm-level and household characteristics, are conceptually distinct and are referred to as such in the corresponding discussion.

Table 11 provides a summary of the variables used in the study.

Table 11. Description of variables

Variables	Description	Measurement
Intention to join cooperative	Farmers intention to join cooperative	Binary: 1=Yes; 0=No
Farmer, Farm & Household		
Age	The age of the respondent in years	Continuous variable, measured in years
Gender	The sex of the respondent	Categorical: 1 = Male; 0 = Female
Household size	Total number of people living in respondent's household	Continuous variable, count of individuals
Education	Highest level of formal education completed	Categorical; entered into the probit as three indicator variables (primary, secondary, tertiary) with no formal education as reference: 0 = No formal; 1 = Primary; 2 = Secondary; 3 = Tertiary
Length of residence in community	Number of years living in current community	Continuous variable, measured in years
Farming experience	Number of years as a cashew farmer	Continuous variable, measured in years
Farm size	Total land area under cashew cultivation	Continuous variable, hectares
Landowner	Farmers' ownership of cultivated land	Binary: 1=Yes; 0=No
Number of hired labourers	Total number of labourers employed in last farming cycle	Continuous variable, count of individuals
Main income source as cashew	Whether cashew farming is the primary income source	Binary: 1=Yes; 0=No
Number of cashew trees	Total cashew trees owned/managed	Continuous variable, count of trees
Production & marketing		
Total harvest (kg)	Cashew nuts harvested last farming season	Continuous variable, kilograms
Total sold (kg)	Raw cashew nuts sold last farming season	Continuous variable, kilograms

Selling price/kg (USD)	Average price received per kilogram	Continuous variable, USD amount
Price satisfaction	Satisfaction with seedling purchase price	Likert: 1=Very dissatisfied to 5=Very satisfied
New cashew trees planted (3 years)	Number of new cashew trees planted in the last 3 years	Continuous variable, count of trees
Cost of cashew seedlings (USD)	Price paid per cashew seedling	Continuous variable, USD amount
Mature cashew trees (>10 years)	Number of fruit-bearing trees older than 10 years	Continuous variable, count of trees
Social Capital & Communication		
Social capital type	Farmers' most used sources for agricultural information	Categorical: 1=Neighbouring farmer; 2=Family members; 3=Friends (1,2, & 3 grouped as bonding social capital); 4=Public extension worker; 5=Private expert/officer; 6=Private extension worker; 7=Input dealers; 8=Cooperative officials/members (4 to 8 grouped as bridging social capital)
Delivery channels	Most used delivery methods for acquiring agricultural information	Categorical: 1=Training; 2=Farmer events (1 & 2 group as formal channels); 3=Face-to-face; 4=Telephone; 5=Others (such as radio programs, agricultural TV shows) (3-5 grouped as informal channels)
Psychological variables		
Intention	Likelihood to join cashew cooperative	Likert: 1=Strongly disagree to 5=Strongly agree
Attitude	Evaluation of cooperative membership	Likert: 1=Strongly disagree to 5=Strongly agree
Subjective norms	Perceived social expectations about joining	Likert: 1=Strongly disagree to 5=Strongly agree
Perceived behavioural control	Confidence in the ability to join	Likert: 1=Strongly disagree to 5=Strongly agree
Knowledge	Understanding of cooperative benefits	Likert: 1=Strongly disagree to 5=Strongly agree
Moral norms	Ethical beliefs about whether joining a	Likert: 1=Strongly disagree to 5=Strongly agree

cooperative is the “right
thing to do”

5. Results

5.1. Descriptive Statistics of Variables in the Study

This section presents the descriptive statistics for the farmer, farm-level and household characteristics, production and marketing variables as well as social capital and information variables. Tables 12 and 14 summarise the continuous variables, and Tables 13 and 15 summarise the categorical variables, separately for Kenya and Nigeria.

5.1.1. Profile of Cashew Farmers in Kenya

Table 12 and Table 13 present the profile of the cashew farmers in Kenya. The table shows that farmers who intend to join cooperatives not only had larger farms but also demonstrated stronger integration into formal agricultural networks which is reflected in their preference for extension services and delivery channels. This may suggest that cooperative engagement is not just a function of economic capacity but also of institutional trust and exposure to professional agricultural guidance.

Also, despite similar gender distributions, farmers who do not intend to join exhibited higher reliance on informal knowledge-sharing, for instance, from neighbouring farmers, which may reflect limited exposure to cooperative models or scepticism toward collective systems. The near absence of hired land among landholders among farmers who have no intention to join (0% vs. 1.83%) hints at a potential land tenure bias, where farmers with less secure ownership may perceive cooperatives as riskier enterprises. Additionally, the education gap where about 77% of farmers who do not intend to join had only primary school education, suggests a possible literacy or numeracy barriers in understanding cooperative benefits, beyond what raw production figures alone would suggest.

Table 12. Summary of continuous variables in the study in Kenya (n = 249)

Variables	Intention to join (n = 218)	No Intention to Join (n = 31)	
	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean diff.
Age	48.00 (13.44)	46.16 (12.63)	1.83
Household size	5.77 (2.65)	5.48 (2.01)	0.29
Length of residence in community	21.56 (14.81)	16.39 (8.80)	5.18 ***
Farm size (Ha)	1.95 (1.23)	1.42 (0.79)	0.53 ***
Total harvest (kg)	351.15 (446.01)	151.61 (133.22)	199.53 ***
Total sold (kg)	325.99 (448.74)	113.06 (139.11)	212.92 ***
Selling price/kg (USD)	0.25 (0.19)	0.04 (0.00)	0.21 ***
Number of cashew trees	28.07 (33.87)	21.52 (14.43)	6.55 *
New cashew trees planted (3 years)	5.55 (7.92)	3.19 (6.30)	2.36 *
Number of hired labourers	0.49 (1.13)	0.35 (0.88)	0.13
Cost of cashew seedlings (USD)	0.05 (0.10)	0.02 (0.06)	0.03 **
Mature cashew trees (>10 years)	17.99 (20.74)	16.35 (12.35)	1.64

The “*” in front of the variable names shows the level of significance in the model. ***p < 0.01, **p < 0.05, *p < 0.1.

Table 13. Summary of categorical variables in the study in Kenya (n = 249)

Variables	Categories	Intention to join (n = 218) Freq. (%)	No intention to Join (n = 31) Freq. (%)
Gender	Male	132 (60.55)	22 (70.97)
	Female	86 (39.45)	9 (29.03)
Education	Primary education	92 (42.20)	24 (77.42)
	Secondary education	36 (16.51)	3 (9.68)
	Tertiary education	38 (17.43)	1 (3.23)
	No formal education	52 (23.85)	3 (9.68)
Landowner	Yes	164 (75.23)	25 (80.65)
	No	54 (24.77)	6 (19.35)
Main income source as cashew	Yes	36 (16.51)	4 (12.90)
	No	182 (83.49)	27 (87.10)
Price satisfaction	Very dissatisfied	0 (0.00)	0 (0.00)
	Moderately dissatisfied	0 (0.00)	0 (0.00)
	Neutral	51 (23.39)	8 (25.81)
	Very satisfied	133 (61.01)	21 (67.74)
	Moderately satisfied	34 (15.60)	2 (6.45)
Social capital type	Neighbouring farmer	22 (10.09)	12 (38.71)
	Family members	11 (5.05)	4 (12.90)
	Friends	40 (18.35)	4 (12.90)
	Public extension worker	65 (29.82)	7 (22.58)
	Private expert/officer	15 (6.88)	2 (6.45)
	Private extension worker	2 (0.92)	0 (0.00)
	Input dealers	29 (13.30)	2 (6.45)
	Cooperative officials/members	34 (15.60)	0 (0.00)
	Face-to-face	107 (49.08)	15 (48.39)
Delivery channels	Telephone	71 (32.57)	2 (6.45)
	Training	18 (8.26)	10 (32.26)
	Farmer events	10 (4.59)	4 (12.90)
	Others	12 (5.50)	0 (0.00)

5.1.2. Profile of Cashew Farmers in Nigeria

Table 14 and Table 15 present the profiles of cashew farmers in Nigeria. Nigerian cashew farmers who intend to join cooperatives demonstrated distinct commercial orientation and institutional engagement. Farmers who intended to join cooperatives operated significantly larger farms and achieved higher yields, with 45% relying on cashew as their primary source of income. This reflects a perception of cooperatives as vehicles for market scaling rather than subsistence support. Interestingly, farmers who intend to join completely abandoned informal information networks, such as neighbour reliance, and shifted decisively toward formal channels like cooperative officials and extension services, indicating that institutional trust is a prerequisite for collective action.

The result of the education of cashew farmers shows distinct patterns across the two groups. The results show that farmers with an intention to join have a higher proportion of tertiary education than those without an intention to join, highlighting the role of formal education in farmers' intention to join. Also, while land ownership patterns were somewhat similar across both groups, farmers who intend to join show a substantially longer community residency and an older age profile. This indicates that social embeddedness and life-stage security may outweigh tenure status in cooperative commitment intentions, reinforcing the institutional trust paradigm observed in Kenya.

Table 14. Summary of continuous variables in the study in Nigeria (n = 321)

Variables	Intention to join (n = 278)	No intention to join (n = 43)	Mean diff.
	Mean (Std. Dev.)	Mean (Std. Dev.)	
Age	49.45 (13.72)	39.35 (10.06)	10.10 ***
Household size	6.63 (3.61)	6.53 (3.24)	0.10
Length of residence in community	20.87 (12.59)	15.37 (6.77)	5.50 ***
Farm size (Ha)	2.91 (1.73)	1.72 (1.14)	1.20 ***
Total harvest (kg)	415.11 (191.11)	202.33 (114.93)	212.78 ***
Total sold (kg)	393.02 (192.02)	152.56 (110.34)	240.46 ***
Selling price/kg (USD)	0.41 (0.07)	0.40 (0.08)	0.01
Number of cashew trees	33.29 (15.48)	27.28 (14.17)	6.01 **
Number of hired labourers	0.65 (1.21)	0.40 (1.12)	0.25
New cashew trees planted (3 years)	2.77 (5.37)	2.26 (3.19)	0.51
Cost of cashew seedlings (USD)	0.32 (0.44)	0.36 (0.46)	-0.04
Mature cashew trees (>10 years)	9.07 (9.25)	11.35 (10.09)	-2.28

The “*” in front of the variable names shows the level of significance in the model. ***p < 0.01, **p < 0.05, *p < 0.10.

Table 15. Summary of categorical variables in the study in Nigeria (n = 321)

Variables	Categories	Freq. (%)	Freq. (%)
Gender	Male	242 (87.05)	36 (83.72)
	Female	36 (12.95)	7 (16.28)
Education	Primary education	10 (3.60)	10 (23.26)
	Secondary education	28 (10.07)	7 (16.28)
	Tertiary education	150 (53.96)	18 (41.86)
	No formal education	90 (32.37)	8 (18.60)
Landowner	Yes	218 (78.42)	38 (88.37)
	No	60 (21.58)	5 (11.63)
Main income source as cashew	Yes	126 (45.32)	8 (18.60)
	No	152 (54.68)	35 (81.40)
Price satisfaction	Very dissatisfied	0 (0.00)	0 (0.00)
	Moderately dissatisfied	27 (9.71)	4 (9.30)
	Neutral	114 (41.01)	15 (34.88)
	Very satisfied	117 (42.09)	22 (51.16)
	Moderately satisfied	20 (7.19)	2 (4.65)
Social capital type	Neighbouring farmer	0 (0.00)	24 (55.81)
	Family members	1 (0.36)	8 (18.60)
	Friends	56 (20.14)	4 (9.30)
	Public extension worker	66 (23.74)	2 (4.65)
	Private expert/officer	3 (1.08)	3 (6.98)
	Private extension worker	2 (0.72)	0 (0.00)
	Input dealers	51 (18.35)	1 (2.33)
	Cooperative officials/members	99 (35.61)	1 (2.33)
	Face-to-face	122 (43.88)	13 (30.23)
Delivery channel	Telephone	114 (41.01)	14 (32.56)
	Training	27 (9.71)	11 (25.58)
	Farmer events	4 (1.44)	2 (4.65)
	Others	11 (3.96)	3 (6.98)

5.2. Observable and Psychological Determinants of Cooperative Membership Intention among Cashew Farmers

This section details the determinants influencing cooperative membership intention among cashew farmers in the study area. Focusing on the observable characteristics (farm and household, social capital and information) and psychological variables using probit regression model and SEM, this section provides the key factors influencing membership among respondents.

5.2.1. Probit Regression Results: Determinants of Farmers' Cooperative Membership Intention in Kenya

Table 16. Result of probit regression model showing factors affecting intention to join cooperatives in Kenya

Variable	Probit Coefficient	Standard Error	Marginal Effect (dy/dx)	Delta-method Standard Error	p-value
Age	-0.011	0.014	-0.001	0.002	0.434
Gender **	-0.747	0.314	-0.103	0.042	0.013
Education					
Primary **	0.856	0.463	0.133	0.055	0.016
Secondary ***	1.543	0.531	0.182	0.039	0.000
Tertiary ***	1.170	0.413	0.161	0.042	0.000
Length of Residence in community	0.020	0.015	0.003	0.002	0.189
Main Income from Cashew	0.645	0.448	0.089	0.062	0.145
Number of Cashew Trees	0.003	0.006	0.000	0.001	0.587
Farm Size	0.182	0.173	0.025	0.024	0.292
Landowner	-0.275	0.307	-0.038	0.042	0.369
Number of Hired Labor	-0.001	0.142	-0.000	0.020	0.996
Social Capital type***	1.354	0.299	0.187	0.036	0.000
Delivery Channel ***	0.870	0.297	0.120	0.039	0.002
Constant	-0.350	0.645	-	-	0.588
Model Statistics					
Number of Observations	249.000				
Log Likelihood	-63.150				
LR chi ² (11)	60.840				

Prob > chi2	0.000
Pseudo R ²	0.325

***p < 0.01, **p < 0.05, *p < 0.10.
Marginal effects represent average marginal effects (change in probability)
The dependent variable is intention to join cashew cooperatives (1=Yes, 0=No)

Table 16 reports the results of the probit regression model on the factors influencing cashew farmers' intention to join cooperatives in Kenya. Bridging social capital and the formality of delivery channel emerge as the most important determinants of intention. Specifically, farmers whose primary information source falls within bridging social capital (i.e., extension officers or agricultural experts, cooperative officials or input dealers) have a significantly higher probability of intending to join, by 18.7 percentage points, relative to those relying on bonding social capital (i.e., family members, neighbouring farmers and friends). This finding validates the first hypothesis (H1) on the role of formal agricultural information networks in cooperative-membership intention among cashew farmers. It indicates that farmers' trust in formal institutions and the acquisition of agricultural information from these sources lowers the perceived risk and increases the value of collective action. Furthermore, the delivery channel through which agricultural information is conveyed is also important. The use of formal delivery channels (such as trainings and farmer events) raises the probability of intention by 12.0 percentage points relative to informal channels (e.g., face-to-face conversations and telephone calls), which suggests that the structured dissemination of information builds trust and conveys the benefits of cooperative membership more convincingly than informal exchanges.

Education exerts a robust, monotonic positive influence on cooperative membership intention. Relative to a farmer with no formal education, completing primary education is associated with a 13.3 percentage-point higher probability of intention ($p < 0.05$), secondary education with an 18.2 percentage-point higher probability ($p < 0.001$), and tertiary education with a 16.1 percentage-point higher probability ($p < 0.001$). The broader pattern remains clear that any formal schooling significantly raises the likelihood of cooperative-membership intention, and the gradient is consistent with the role of formal education in helping farmers understand the cooperative model and its long-term benefits.

Gender is another significant predictor of cooperative membership intention in the Kenya case study where female farmers exhibit a 10.3 percentage-point higher probability of intention than male farmers ($p < 0.05$), which could suggest that cooperatives are perceived in the Kenyan setting as a vehicle for overcoming structural barriers, cultural constraints, and achieving economic empowerment. Tenure status, captured by the binary indicator distinguishing land owned by the household, is not statistically significant ($p = 0.369$), indicating that tenure status per

se is not a meaningful predictor of cooperative-membership intention in the Kenya sample with other observable characteristics held constant. The model's moderate explanatory power (Pseudo $R^2 = 0.325$) suggests that additional unmeasured factors such as institutional and trust factors, psychological and behavioural factors, past experiences and knowledge, social and cultural factors, and market and contextual linkages could influence cooperative-membership intention. Therefore, the study probes further to examine the influence of psychological variables to determine farmers' intention to join cashew cooperatives.

The strongly negative and statistically insignificant constant indicates that, in the absence of the motivating factors identified above (for instance, for a male farmer with no formal education, on extended-family or hired land, drawing on bonding social capital and informal delivery channels), the baseline probability of intending to join is very low.

5.2.2. Probit Regression Results: Determinants of Farmers' Cooperative Membership Intention in Nigeria

Table 17. Result of probit regression model showing factors affecting intention to join cooperatives in Nigeria

Variable	Probit Coefficient	Standard Error	Marginal Effect	Delta-method Standard Error	p-value
Age **	0.056	0.024	0.002	0.001	0.013
Gender	0.974	0.675	0.036	0.025	0.146
Education					
Primary **	1.821	0.763	0.168	0.079	0.034
Secondary **	2.621	0.789	0.197	0.077	0.011
Tertiary ***	2.824	0.834	0.202	0.077	0.009
Length of Residence in community	0.056	0.033	0.002	0.001	0.101
Main Income from Cashew **	1.276	0.640	0.047	0.024	0.042
Number of Cashew Trees **	0.054	0.024	0.002	0.001	0.017
Farm Size	0.294	0.178	0.011	0.007	0.110
Landowner	-0.344	0.255	-0.013	0.009	0.167
Number of Hired Labor **	0.435	0.207	0.016	0.007	0.030
Social Capital ***	4.706	0.880	0.176	0.023	0.000
Delivery Channel	-0.053	0.539	-0.002	0.020	0.921
Constant ***	-10.505	2.699	-	-	0.000
Model Statistics					
Number of Observations	321.000				
Log Likelihood	-21.597				
LR chi ² (11)	209.650				
Prob > chi2	0.000				
Pseudo R ²	0.829				
***p < 0.01, **p < 0.05, *p < 0.1.					
Marginal effects represent average marginal effects (change in probability)					
The dependent variable is intention to join cashew cooperatives (1=Yes, 0=No)					

Table 17 presents the determinants influencing cashew farmers' intention to join cooperatives. The probit regression model for the case study in Nigeria also reveals interesting and distinctive set of drivers influencing farmers' intention to participate in cooperative activities. The model exhibits an exceptionally high explanatory power (Pseudo R² = 0.829) suggesting that the included farmer, farm and

household characteristics and social-capital variables jointly account for the great majority of the variation in farmers' cooperative-membership intention. The results show that social capital is a dominant variable influencing intentions. Bridging social capital is the dominant variable. The marginal effect of social capital (0.176) is highly significant ($p < 0.001$) and considerably larger than that of any other variable in the model which indicates that in the Nigerian context, a farmer's integration into formal networks with agricultural experts and institutional actors is the primary determinant of cooperative-membership intention. This suggests that familiarity with formal systems significantly reduces perceived risks and informs the farmer about the prospective benefits of collective action. Unlike in Kenya, the formality of the delivery channel is not statistically significant ($p = 0.921$). This implies that, in the Nigerian context, while the source of agricultural information is fundamentally important, the medium of communication (delivery channel) by which it is delivered is not important.

Education exerts a strong, monotonic and statistically significant influence on cooperative-membership intention in the Nigerian cast study. This result is interpreted relative to a farmer with no formal education, where result shows that completing primary education is associated with a 16.8 percentage-point higher probability of intention ($p < 0.05$), secondary education with a 19.7 percentage-point higher probability ($p < 0.05$), and tertiary education with a 20.2 percentage-point higher probability ($p < 0.01$). The upward gradient highlights the role of formal education in shaping farmers' intention to join cooperatives in Nigeria, which is in line with the literature suggesting that knowledge and cognitive skills facilitate the understanding of the cooperative model and its long-term benefits. Aside from the role that education plays in influencing membership intention among farmers, age (+0.2 pp per year, $p < 0.05$), the number of cashew trees managed (+0.2 pp per additional tree, $p < 0.05$), the number of hired labourers engaged (+1.6 pp per labourer, $p < 0.05$), and reliance on cashew as the main source of household income (+4.7 pp, $p < 0.05$) all show a positive and significant influence on intention, which together indicate that more commercially oriented Nigerian cashew farmers view cooperatives as a viable institution through which to scale operations and access export markets.

In contrast to what we observed in Kenya, the insignificant result observed in the gender variable suggests that the intention to participate is not gendered in Nigeria, where both men and women are equally likely to participate based on their assets and networks. The land tenure status of the farmer is also not statistically significant ($p = 0.167$), which indicates that tenure status per se does not exert a meaningful independent effect on cooperative-membership intention in Nigeria when other observable characteristics are accounted for.

The strongly negative and significant constant shows that in the absence of the motivating factors identified (for instance, for a young farmer with low education,

small farm, and only bonding social capital and informal delivery channel), the baseline probability of intending to join is very low. Hence, we proceed to examining the psychological factors influencing participation intention among cashew farmers for Nigerian case study.

5.2.3. Psychological Determinants of Farmers' Intention to Join Cooperatives in Kenya

Having established the measurement model in the preceding section, the focus now shifts to the structural model, aimed at exploring relationships among the latent variables. Once again, we employ maximum likelihood with robust standard errors (MLR) estimation for SEM, a recommended approach for non-normally distributed data, as opined by Rosseel (2012). The SEM results for the relationship are shown in Figure 14.

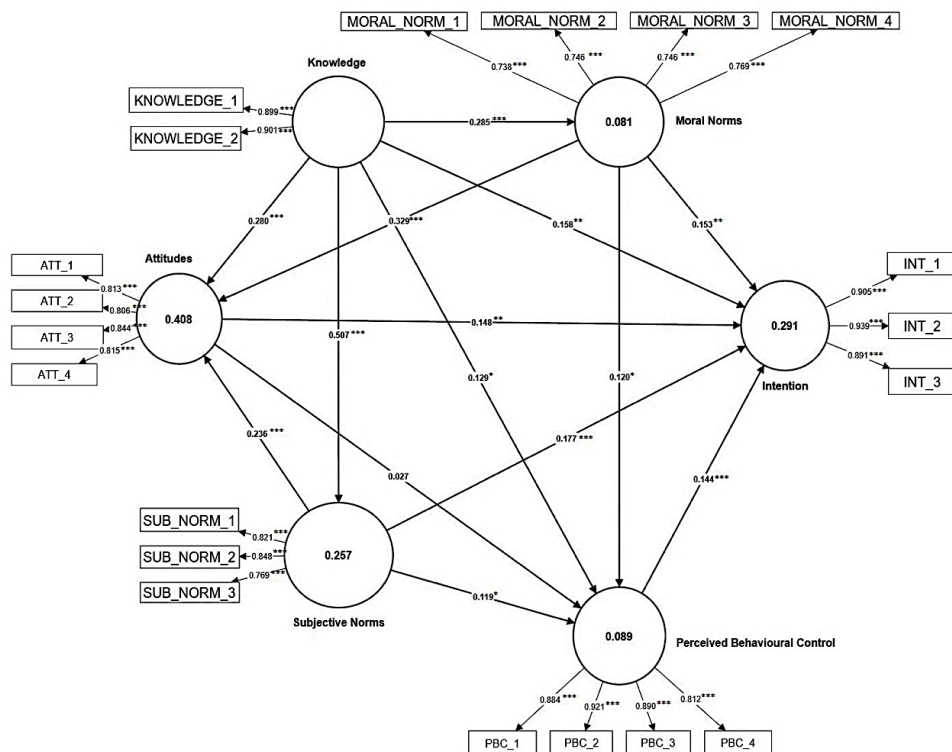


Figure 14. The estimated SEM in Kenya

*** $p < 0.01$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$. SEM model fit: $\chi^2(249) = 542.248$, CFI = 0.955, TLI = 0.945, RMSEA = 0.047, SRMR = 0.069.

In complex SEM studies involving more than 12 measurement items, such as the present study, achieving an identical theoretical and observed structural model at a 5% statistical significance level can be challenging (Hair et al. 2011). In such

instances, it is crucial for the chi-square statistic to degrees of freedom (DF) ratio to remain below three, as defined by Bollen and Long (1992). The estimated SEM model meets this criterion with a ratio of 2.178 (542.248/249), signifying a robust model fit.

Additionally, the model satisfies other requisite indices for fit. Both the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) exceed the 0.900 threshold, while the Root Mean Square Error Approximation (RMSEA) and Standardised Root Mean Square Residual (SRMR) fall below the 0.080 benchmark. As a result, the SEM estimations are considered valid. The variance in the endogenous variable, intention, represented by the R-square value of the latent endogenous variable, is approximately 29%, as revealed by the model (Figure 10).

As a measure to ensure the robustness of the analysis, we apply the Partial Least Squares (PLS) Structural Equation Modelling (SEM) approach, as recommended by Hair et al. (2011). This method was also adopted by Munim and Noor (2020). Detailed results of the PLS-SEM estimation can be found in Appendix E. Remarkably; it is worth noting that both the covariance-based SEM and the PLS-SEM (see Appendix E) yield congruent results when subjected to hypothesis testing.

From the SEM model illustrated in Figure 14, we provide a concise overview of path testing in Table 18. The table provides a comprehensive summary of the path testing results, shedding light on the factors influencing the intention of cashew farmers in Kenya to join marketing cooperatives. The standardised coefficients and their corresponding standard deviations indicate the strength and direction of the relationships between latent constructs. Notably, all paths that postulate associations between different latent variables and farmer intention have yielded significant results, reinforcing the importance of these factors in shaping farmers' intentions. Path numbers 1 through 5, which explore the direct relationships between attitudes, knowledge, moral norms, perceived behavioural control, and subjective norms with farmer intention, have all garnered substantial support, with T-values indicating vital statistical significance. Furthermore, the table delves into indirect effects, including paths 6 to 13, which investigate the interplay between these latent constructs, contributing to a comprehensive understanding of the complex dynamics involved in farmer intention formation.

Table 18. Summary of path testing (Kenya)

No.	Path variable (independent)		Dependent variable	Standardised coefficient (Std. Dev)	T-value
1	Attitude	→	Intention	0.148 (0.072)	2.072 **
2	Moral norms	→	Intention	0.152 (0.068)	2.247 **
3	Subjective norms	→	Intention	0.178 (0.069)	2.553 ***
4	PBC	→	Intention	0.145 (0.057)	2.548 ***
5	Knowledge	→	Intention	0.156 (0.068)	2.336 **
6	Attitude	→	PBC	0.025 (0.086)	0.316
7	Knowledge	→	PBC	0.130 (0.079)	1.631 *
8	Moral norms	→	PBC	0.121 (0.079)	1.519 *
9	Subjective Norms	→	PBC	0.124 (0.077)	1.549 *
10	Knowledge	→	Attitude	0.343 (0.066)	2.200 ***
11	Moral norms	→	Attitude	0.333 (0.055)	5.933 ***
12	Subjective norms	→	Attitude	0.235 (0.059)	3.990 ***
13	Knowledge	→	Moral norms	0.287 (0.063)	4.532 ***
14	Knowledge	→	Subjective norms	0.509 (0.057)	8.871 ***

Standard error in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The total effect (predictive power) of each independent variable on the dependent variable (intention to join marketing cooperatives) is presented in Table 19. The standardised total effect is the total effect of a variable on another variable, considering all the direct and indirect effects. Intention to join marketing cooperative (dependent variable) among cashew farmers in Kenya was affected mainly by cooperative knowledge (0.399) (validating our second hypothesis - H2), followed by subjective norms (0.230), moral norms (0.220), attitudes (0.152) and perceived behavioural control (0.144) of the farmers. Additionally, the knowledge construct affected farmers' subjective norms (0.507), attitude (0.493), moral norms (0.285) of the farmers, as well as perceived behavioural control (0.238) towards joining a marketing cooperative. In succession, moral norms, subjective norms, and attitudes affected the perceived behavioural control of the farmers. However, we did not find a statistically significant association between attitude and perceived behavioural control in Table 18. Similarly, subjective and moral norms also affected farmers' attitudes to join the cashew marketing cooperative.

Table 19. Standardised total effects (Kenya)

Path variable (independent)	Dependent variable	Total effects	
Attitudes	Intention	52	0.1
Moral norms	Intention	20	0.2
Subjective norms	Intention	30	0.2
Perceived behavioural control	Intention	44	0.1
Knowledge	Intention	99	0.3
Attitudes	Perceived behavioural control	27	0.0
Knowledge	Perceived behavioural control	38	0.2
Moral norms	Perceived behavioural control	29	0.1
Subjective norms	Perceived behavioural control	26	0.1
Moral norms	Attitudes	29	0.3
Knowledge	Attitudes	93	0.4
Subjective norms	Attitudes	36	0.2
Knowledge	Moral norms	85	0.2
Knowledge	Subjective norms	07	0.5

5.2.4. Psychological Determinants of Farmers' Intention to Join Cooperatives in Nigeria

Employing the MLR estimation for SEM, as Rosseel (2012) recommended for non-normal data, we present the estimated SEM in Figure 15. Similar to the SEM analysis carried out for the case study in Kenya, the estimated SEM model meets all validation criteria ($525.931/321 = 1.638$), indicating a good model fit.

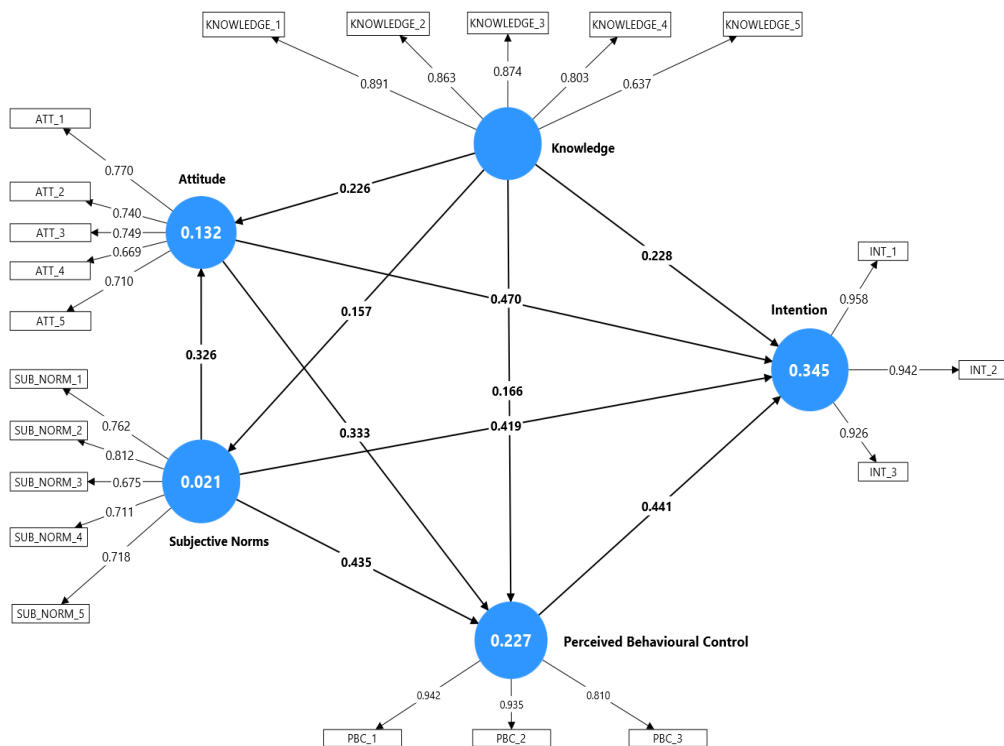


Figure 15. Graphical output of factors affecting farmers' intention to join cooperatives.

SEM model fit: $\chi^2 (321) = 525.931$, CFI = 0.965, TLI = 0.959, RMSEA = 0.050, SRMR = 0.060

Also, other model-fit indices meet the criteria, with CFI and TLI exceeding 0.900 (see Figure 15). Also, both RMSEA and SRMR are below the threshold of 0.080. This suggests that the model, overall, is a good representation of the data. Additionally, to verify the reliability and validity of the findings, an additional analysis was conducted utilising the partial least squares structural equation modelling (PLS-SEM) technique, following Hair et al. (2011). The detailed outcomes of this PLS-SEM estimation are illustrated in Appendix J. The supplementary analysis confirms that the results obtained from covariance-based SEM are consistent with those derived from the PLS-SEM approach, demonstrating robustness across both analytical methods.

The model (Figure 15) indicates that the variance in the endogenous variable, intention, as represented by the R-square value of the latent endogenous variable, is approximately 35%.

Table 20. Summary of path testing (Nigeria)

Path variable (independent)		Dependent variable	Standardised coefficient (std. dev)	T-value
Attitude	→	Intention	0.305 (0.053)	5.922 ***
Subjective norms	→	Intention	0.203 (0.047)	8.293 ***
PBC	→	Intention	0.237 (0.051)	4.613 ***
Knowledge	→	Intention	0.088 (0.045)	1.963 **
Attitude	→	PBC	0.201 (0.054)	3.748 ***
Knowledge	→	PBC	0.065 (0.044)	1.451
Subjective norms	→	PBC	0.359 (0.052)	6.892 ***
Knowledge	→	Attitude	0.179 (0.055)	3.238 ***
Subjective norms	→	Attitude	0.298 (0.051)	5.893 ***
Knowledge	→	Subjective norms	0.157 (0.064)	2.457 ***

Standard deviation in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Applying the SEM illustrated in Figure 15, we present a detailed summary of the paths in Table 20. All latent variables, namely perceived behavioural control, subjective norms, attitudes and knowledge, showed a positive and significant effect at acceptable levels on farmers' intention to participate in cashew cooperatives. This implies that increased attitudes toward cooperation, perceived behavioural control, subjective norms, and knowledge correspond to an increased intention to join cashew groups. In the same vein, the impact of the knowledge construct further exhibited positive effects on farmers' attitude and subjective norms, with statistically significant effects observed at 1% ($p < 0.001$) for both, thus validating our second hypothesis (H2) on the positive influence of cooperative knowledge on membership intentions. Likewise, attitudes and subjective norms constructs demonstrated positive and statistically significant effects ($p < 0.001$) on perceived behavioural control. Finally, the paths of subjective norms leading to attitudes are also significant and positive ($p < 0.001$).

Table 21. Standardised total impacts (Nigeria)

Construct	Intention	PBC	Attitude	Subjective norms
PBC	0.237			
Attitude	0.353	0.201		
Subjective norms	0.393	0.419	0.297	
Knowledge	0.228	0.166	0.226	0.157

The result in Table 21 indicates the relative importance of each construct in influencing farmers' intentions to join cooperatives. Subjective Norms have the strongest total impact on intention (0.393), highlighting that social influences,

expectations, and perceived social acceptance predominantly shape farmers' intentions. Attitude closely follows, with the second-highest total impact on intention (0.353), underscoring that positive attitudes toward cooperatives significantly encourage farmers to consider membership. Perceived Behavioural Control (PBC) ranks third, showing a moderate but meaningful total impact (0.237) on intention, suggesting farmers' perception of their capability to join cooperatives also significantly influences their decision. Lastly, Knowledge, while influential, has the lowest direct total effect on intention (0.228), yet it plays an essential foundational role by influencing Subjective Norms (0.157), Attitude (0.226), and Perceived Behavioural Control (0.166), which indirectly enhances farmers' intention. The analysis revealed strong empirical support for all the paths within the model, with T-values confirming high statistical significance across all paths.

5.3. Gendered Dimensions of Agricultural Information Exchange among Respondents

The chapter shows results on farmers' most used sources and delivery channels of agricultural information for both investigated countries. The farmers were asked to report only one source and one delivery channel that they used most for reaching information about cashew production practices, including agronomic advice, input use, post-harvest handling, and market-related guidance. It is worth noting from the outset that all respondents in this analysis were non-members of formal cashew marketing cooperatives at the time of data collection, as the study was specifically designed to capture prospective rather than current cooperative members (see Section 4.2). This means that a disaggregation by cooperative membership status alongside gender was not warranted here, since the sample is uniform in that regard.

5.3.1. Gender of Farmers' and Most Used Information Source and Delivery Channels for Accessing Agricultural Information in Kenya

Figure 16 shows the descriptive statistics of gender against the farmers' most used source of general agricultural information related to cashew production, including agronomic advice, input use, and market guidance. Private experts and officers emerge as the most consulted source among both male and female farmers in Kenya, with female farmers showing a marginally higher rate of consultation than males. Other sources that matter to cashew farmers include public extension workers, cooperative officials or members, private extension workers, and neighbouring

farmers. Male farmers appear to rely more on public extension workers, cooperative officials or members, and private extension workers. Female farmers, on the other hand, show a slightly higher preference towards neighbouring farmers, family members, friends, input dealers, and private experts or officers.

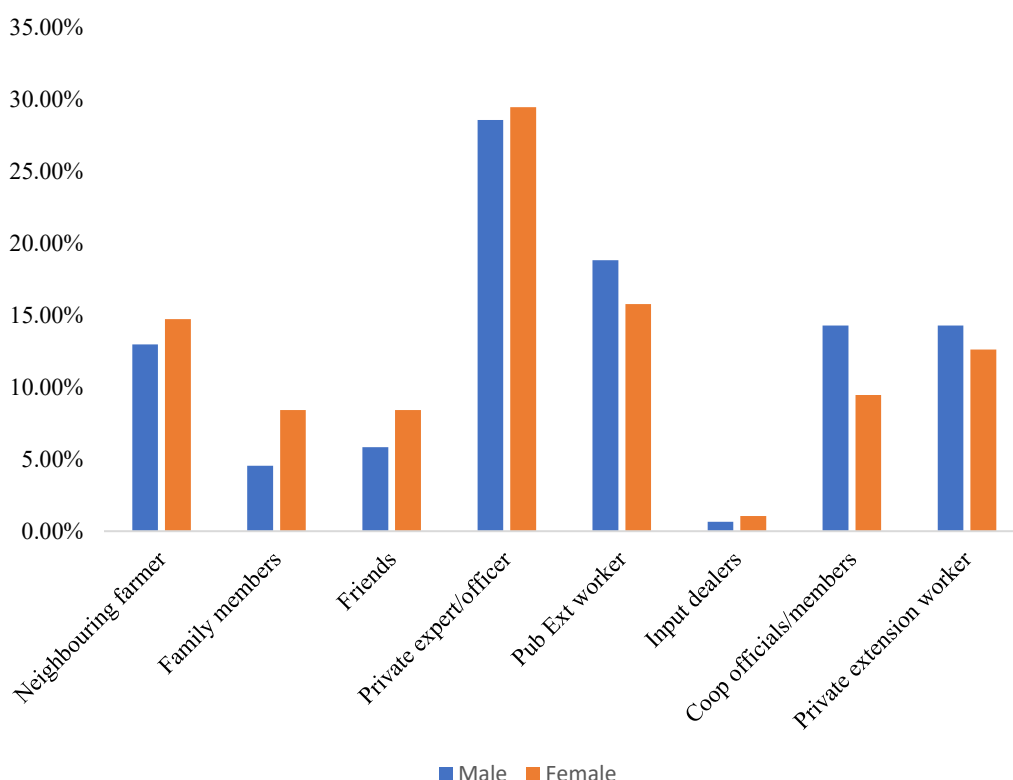


Figure 16. Farmers most used information sources in Kenya disaggregated by gender (n = 249)

The relationship between farmers' gender and their most used source of agricultural information is shown in

Table 22. The analysis reveals a pattern where gender shows almost no statistically significant association with farmers' most used sources of agricultural information. Across all categories of social capital, that is, bonding (neighbours, family, friends) and bridging (extension services, input dealers, cooperative officials). The chi-square tests consistently yield non-significant p-values (all >0.05) and negligible effect sizes ($\phi < 0.1$). This neutrality suggests that, at least in this context,

male and female farmers tend to rely on similar channels when seeking farming knowledge.

Looking more closely at the descriptive patterns, bonding capital sources recorded consistently low consultation rates for both men and women. Neighbours, family members, and friends are simply not where these farmers go first for agricultural advice, regardless of gender. Bridging sources tell a different story. Both male and female farmers relied mostly on private experts and officers, followed by public extension workers. This convergence suggests that both male and female farmers broadly agree on where reliable agricultural information resides, namely in technically competent, formal or semi-formal sources. The absence of gender-based differences in this regard therefore shows a shared perception of information quality rather than a structurally equal system. Whether men and women access these bridging sources under the same conditions is a separate and more complex question. Women may consult the same extension workers as men but face greater difficulty acting on the advice received due to constraints such as limited control over land, inputs, or household finances. Capturing these dynamics falls outside of the scope of this current thesis and its quantitative method and would require a dedicated qualitative investigation.

Table 22. Investigating the impact of gender on farmers' most used information sources (in Kenya)

Social Capital	Information Source	χ^2	df	p-value	ϕ/V	Interpretation
Bonding	Neighbouring farmer	0.153	1	0.696	0.025	No significant association
	Family members	1.559	1	0.212	0.079	No significant association
	Friends	0.613	1	0.434	0.050	No significant association
Bridging	Public extension worker	0.374	1	0.541	0.039	No significant association
	Private expert/officer	0.023	1	0.879	0.010	No significant association
	Private extension worker	0.136	1	0.712	0.023	No significant association
	Input dealers	0.120	1	0.729	0.022	No significant association
	Cooperative officials/members	1.248	1	0.264	0.071	No significant association

Note: ϕ = Phi coefficient (for 2×2 tables). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Effect size thresholds: 0.10 (small), 0.30 (medium), 0.50 (large).

The descriptive statistics of gender against farmers' most used delivery channel for agricultural information are shown in Figure 17. Face-to-face communication is by far the most used channel among both male and female farmers in Kenya, with nearly half of each group choosing it as their primary mode. This finding connects meaningfully to the earlier observation that private experts and officers are the most consulted information source for both genders. Private officers who provide on-farm visits or are available at short notice would naturally be

experienced through direct personal interaction, and the paid nature of such services likely drives expectations of quality and relevance in the cashew farming advice they provide, covering areas such as agronomic practices, input use, and post-harvest handling.

Telephone communication ranks second, and is particularly favoured among female farmers. Training sessions follow as the third most used channel, also slightly more common among female than male farmers. Farmer events and other channels such as radio or agricultural television are the least used overall, with male farmers showing a somewhat higher preference for these than females. Taken together, direct personal interaction, whether face-to-face or by phone, remains the dominant mode of agricultural information delivery for both genders in this context.

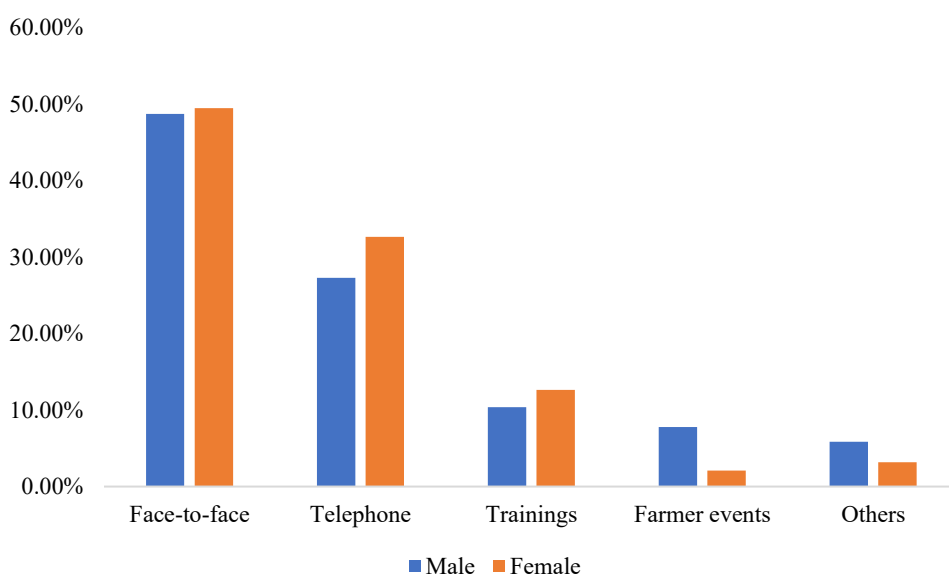


Figure 17. Farmers most used delivery channels in Kenya disaggregated by gender (n = 249)

In terms of the association of gender on farmers’ most used delivery channels, Table 23 provides the result of the chi-square test carried out. The analysis of farmers most used delivery channels reveals that gender plays almost no role in shaping how farmers access agricultural information. Farmer events showed a statistically significant association at the 10% level, $\chi^2 = 3.581$, $p = 0.058$, $\phi = 0.120$. This suggests that gender may be related to farmers’ preferences for farmer events, although the relationship is weak, as the effect size is small. Since the p-value is greater than 0.05, this result should be interpreted cautiously as marginally significant, not strongly significant.

Other delivery channels of delivery show no notable gender association, which suggests that men and women farmers do not differ in their usage for the means or delivery channels through which information reaches them.

This consistency implies that, at least in this context, male and female farmers rely on similar communication pathways for agricultural information. The absence of strong gender-based differences could reflect equitable access to these channels or a homogenization of communication practices within the farming community in Kenya.

Hence, these results on farmers' most used agricultural information sources and delivery channels in Kenya are consistent with the null hypothesis (H3) of independence between gender and information access in Kenya.

Table 23. Influence of gender on farmers' most used delivery channel (in Kenya)

	Channel Type	χ^2	df	p-value	ϕ/V	Interpretation
Formal channels	Trainings	0.296	1	0.586	0.034	No significant association
	Farmer events *	3.581	1	0.058	0.120	Significant, small effect
Informal channels	Face-to-face	0.014	1	0.906	0.008	No significant association
	Telephone	0.814	1	0.367	0.057	No significant association
	Others	0.924	1	0.336	0.061	No significant association

Note: ϕ = Phi coefficient (for 2×2 tables). ***p < 0.01, **p < 0.05, *p < 0.10. Effect size thresholds: 0.10 (small), 0.30 (medium), 0.50 (large).

5.3.2. Gender of Farmers and Most Used Information Methods and Delivery Channels for Accessing Agricultural Information in Nigeria

This section examines the association between gender and farmers' most commonly used agricultural information sources and delivery methods in Nigeria. The descriptive statistics are shown in Figure 18 and the Chi-square test of independence is shown in Table 24. Results in Figure 18 shows that private extension workers are the most used information source among both male and female farmers in Nigeria, with women showing a slightly higher preference than males. Private experts/officers and public extension workers are also important sources for both genders, while male farmers are more inclined to turn to cooperative officials/members than female farmers. Female farmers rely more on neighbouring farmers than males, whereas family members, friends, and input dealers are among the least used sources overall.

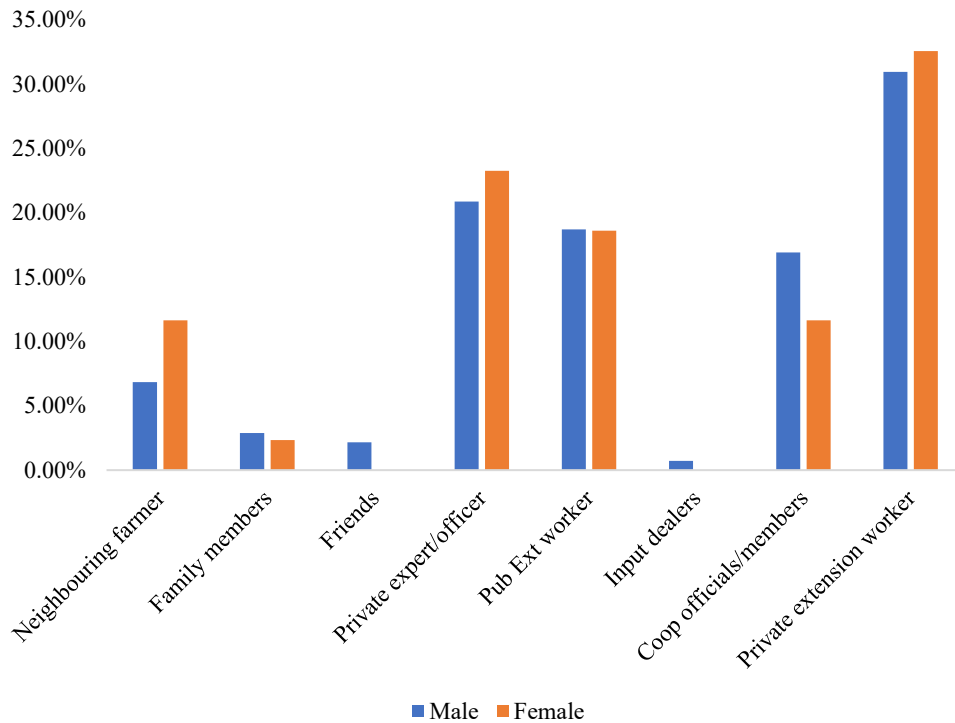


Figure 18. Farmers most used information sources in Nigeria disaggregated by gender (n = 321)

The chi-square analysis (Table 24) indicates that gender does not significantly influence farmers' most used information sources for accessing agricultural information across both bonding and bridging social capital categories, nullifying our third hypothesis (H3). The negligible effect sizes ($\phi < 0.10$) further reinforce the absence of meaningful gender-based differences in communication preferences. These findings suggest that, in this context, gender does not play a defining role in shaping how farmers seek or share agricultural information.

Table 24. Investigating the impact of gender on farmers' most used information sources (in Nigeria)

Social capital	Information source	χ^2	df	p-value	ϕ/V	Interpretation
Bonding	Neighbouring farmer	1.237	1	0.266	0.062	No significant association
	Family members	0.042	1	0.838	0.011	No significant association
	Friends	0.946	1	0.331	0.054	No significant association
Bridging	Public extension worker	0.000	1	0.987	0.001	No significant association
	Private expert/officer	0.128	1	0.721	0.020	No significant association
	Private extension worker	0.046	1	0.831	0.012	No significant association
	Input dealers	0.311	1	0.577	0.031	No significant association
	Cooperative officials/members	0.764	1	0.382	0.012	No significant association

Figure 19 shows that face-to-face and telephone communication are the dominant delivery channels among farmers in Nigeria. Male farmers show a slightly higher usage for face-to-face communication, while female farmers show a higher usage for telephone communication making telephone the top choice among females. Trainings are a distant third for both genders with females again slightly higher than males. Farmer events and other channels are the least used overall. This may suggest that farmers mainly use direct and easily accessible delivery methods.

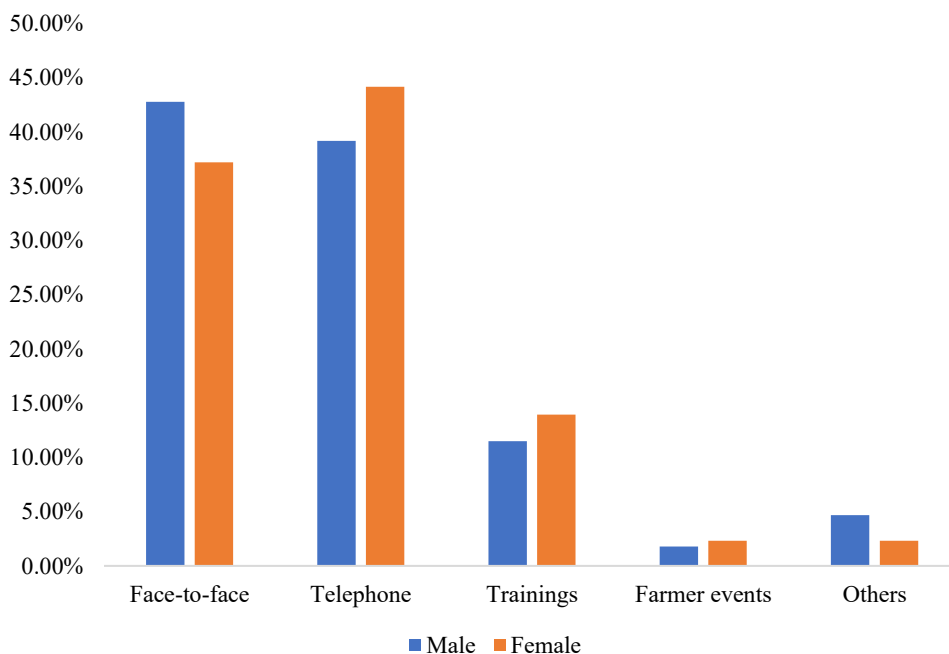


Figure 19. Farmers most used delivery channel in Nigeria disaggregated by gender (n = 321)

Similar to the association of gender on farmers' most used communication methods for receiving agricultural information in Kenya, the result in Table 25 also reveals no statistically significant influence of gender on farmers' most delivery channels, as none of the tested associations, whether formal or informal, yielded significant results ($p > 0.1$). This nullifies our third hypothesis (H3) on the influence of gender on delivery channels. The consistently small effect sizes ($\phi < 0.10$) further emphasize the lack of meaningful gender-based differences in delivery channel usage. This suggests that male and female farmers in this region exhibit similar communication behaviours when accessing agricultural information, potentially reflecting shared needs or constraints within the farming community. The findings show that men and women use similar channels, but this does not mean gender-neutral communication strategies are sufficient in practice. In the Nigerian cashew sector, women face well-documented structural barriers including constrained land access, limited decision-making authority within households, and time burdens from domestic responsibilities that can significantly restrict their ability to act on agricultural information, even when they access it through the same channels as men.

Hence, these results on farmers' most used agricultural information sources and delivery channels in Nigeria are consistent with the null hypothesis (H3) of independence between gender and information access in Nigeria.

Table 25. Influence of gender on farmers' most used delivery channel (in Nigeria)

	Channel Type	χ^2	df	p-value	ϕ/V	Interpretation
Formal channels	Trainings	0.213	1	0.644	0.026	No significant association
	Farmer events	0.056	1	0.812	0.013	No significant association
Informal channels	Face-to-face	0.479	1	0.489	0.039	No significant association
	Telephone	0.385	1	0.535	0.035	No significant association
	Others	0.493	1	0.482	0.039	No significant association

Note. ϕ = Phi coefficient (for 2×2 tables). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Effect size thresholds: 0.10 (small), 0.30 (medium), 0.50 (large).

6. Discussion

6.1. Introduction

This chapter analyses and integrates findings from Kenya and Nigeria, particularly how farm and household factors, institutional factors (social capital), psychological factors and gender dimensions interact to influence the intentions of cashew farmers to join cashew cooperatives. While the studies were carried out in two distinct national contexts, both highlight the importance of access to quality agricultural information as a central factor driving intentions to join cooperatives. The formation of these cooperatives is an important tool to enhance smallholder farmers integration into export-oriented agricultural value chains. The findings from this study are significant for other, less resource African cashew producing countries seeking to improve smallholder participation in global markets. The overall results from both case studies reveal that while the general goal of collective action is shared in both case studies, the pathways to farmers' cooperative intentions are shaped by different local socio-institutional contexts. Of note, this discussion does not attempt a direct comparison between Kenya and Nigeria but instead situates the factors influencing cooperative intention within the specific realities and context of the cashew sector in their distinct nationalities.

Although several studies have applied the social capital theory to understand information dissemination and the adoption of agricultural practices (Isaac et al. 2007; Mashavave et al. 2013; Jara-Rojas et al. 2020), collective action and cooperative membership (Markelova & Meinzen-Dick 2009; Mojo et al. 2017; Yu et al. 2023), as well as trust and cooperation nexus amongst farmers (Pretty and Ward 2001), this study applied social capital theory through the articulation of formal (bridging social capital) and informal (bonding social capital) agricultural information sources as well as the formal (e.g., training, farmer events) and informal (personal interaction such as telephone, face-to-face) means of delivery to examine the nexus of relationships and interactions with various actors and their effects on farmers' intentions to join cooperatives. To understand the determinants (farmer, farm and household characteristics and social capital type) of farmers' intention to join cashew cooperatives, a probit regression model was utilised. Additionally, the presence of gendered patterns in agricultural information access and delivery was examined using chi-square test of independence between the gender of the farmer and their most used information source alongside the most used delivery channels.

6.2. Farmer, Farm, Household and Institutional Determinants of Cooperative Membership Intention

A fundamental result across both case studies is the central role of formal social capital, that is, bridging social capital (i.e. formal information sources), in driving participation intention among respondents. This variable emerged as the most significant and consistent finding across both case studies although the effects of the result differ significantly in both contexts of interest. In Kenya and Nigeria, the exceptionally powerful effect of social capital (0.187 and 0.176, respectively) on farmers' intention to join suggests that for a cashew farmer in Nigeria, the connection to an agricultural extension officer, whether private or public, an agricultural expert, input dealers or cooperative officials, does not only inform and nudge them towards cooperative participation, but it significantly reshapes their perception about the benefits and risks associated with membership in such groups (Wossen et al. 2017b). This highlights the critical role institutional knowledge dissemination plays in promoting collective action (Crescenzi et al. 2013; Koutsouris & Zarokosta 2022). Hence, in a cashew value chain that is often associated with fluctuating prices and high activities of intermediaries, a farmer's trust in information provided by agricultural experts acts as a crucial signal of credibility. The result supports the innovation systems view (Klerkx & Jansen 2010; Luo et al. 2017) and institutional economics (Williamson 2000), suggesting that formal information from experts helps decrease the asymmetry of information and facilitates collective action (Staatz 1987; Andriani & Christoforou 2016). Therefore, when agricultural extension officers vouch for a cooperative, it offsets the uncertainties inherent to the chain. This also suggests that farmers are more likely to participate in cooperatives when they see a direct, tangible link to the leadership in existing cooperatives (Chen & Sun 2019). Therefore, in a context where the models of cooperatives are met with scepticism, agricultural information from existing cooperative officials may act as a crucial bridge of credibility and practical knowledge, making the assumed idea of a cashew cooperative feel familiar, viable and even less-risky to join. These officials provide and transfer the institutional trust by providing tangible proof of concept that reduces the perceived risk of membership.

Aside from the role that social capital plays in influencing farmers' intention to join cooperatives, the channels of delivering information is equally important (Churi et al. 2012). The negative and significant effect of informal delivery channel (where formal channel is the base for comparison) in Kenya reveals that the way a farmer receives agricultural information is as important as where or who it comes from (Wang et al. 2023). For instance, a study in China reveals that government-led, in-

person communication and practical demonstrations led to greater adoption of green agricultural technologies than information received through broadcast medium like radio (Wang et al. 2023). The percentage point advantage of 12.0 of formal channels, such as through farmer events, training and field days, suggests that these structured settings are crucial for building the complete understanding that is critical for farmers' cooperative participation intention. This implies that while casual, face-to-face interaction may be sufficient to for sharing simple price information, it may be inadequate to convince a farmer to make a more profound shift in their operations such as changing their business model and pooling resources together with other farmers (Magakwe & Olorunfemi 2024; Begho & Oraye 2025). Formal delivery methods, such as during field days or trainings, between farmers and sources of agricultural information allow for detailed explanations, demonstrations as well as question and answer sessions that addresses complex topics that may be poorly suited for information conversations, like farmers' specific concerns about membership fees, governance and profit-sharing in cooperatives (Begho & Oraye 2025). This finding suggests that for cashew farmers in Kenya, the detailed and structured nature of formal delivery of information through trainings and scheduled farmer events does not only pass agricultural information, but it also actively establishes the credibility and trustworthiness of the cooperative institution itself as the thorough nature of the process indicates professionalism, commitment and transparency which informs the farmer that the model is a genuine and reliable venture (Matuschke 2008; Matuschke & Qaim 2009).

In contrast, the non-significant effect of delivery channel on participation intention in Nigeria suggests that once a farmer trusts the source of agricultural information (for instance, a respected extension agent or cooperative leader), the channel of delivery becomes secondary. This result aligns with the concept of "social learning" where individuals in close-knit communities and high trust levels depend more on the credibility of information source rather than the channel through which it is delivered (Bandiera & Rasul 2006). This result could be attributed to the fact and the context that agricultural information is scarce, and the credibility of the messenger overrides the medium of delivery (Rogers 2003). Therefore, if an agricultural expert recommends cooperative participation as a gateway for overcoming market vulnerabilities, secure stable income or access knowledge and networks, the recommendation may carry as much weight as formal training session. This, however, does not suggest that the mode of delivery is unimportant, but rather should not be the most prioritized in terms of information dissemination to farmers (Rogers 2003). This system utilizes existing social mechanisms for efficient outreach as observed in other smallholder environments in SSA (Genius et al. 2013) where extension system and information delivery should leverage existing, trusted networks for information dissemination.

Results further revealed interesting insight into the role of human capital (in form of farmers level of education), commercial readiness (in form of scale operations and market orientation) and social hierarchy (in form of seniority within the community) as influencing factors crucial to cooperative participation intention. The farm and household variables have context-specific dynamics in their relative importance. Result showed a strong positive relationship between farmers' education and cooperative participation intention in Kenya as well as Nigeria. According to Poole & Donovan (2014) and Lei et al. (2024), this indicates the critical role that human capital plays in promoting institutional involvement. According to the literature's description of educated agents' superior group solving abilities, educated farmers have superior skills to understand complex cooperative structures, contracts, quality standards, and long-term benefits (Ostrom 2000). The magnitude of this effect was found to be highly significant in both case studies, perhaps reflecting the complexity of the cashew value chain in terms of export documentation, and quality processes which demands greater literacy levels (Maertens & Swinnen 2009). Hence, the role of cooperatives in export-oriented value chains are not just establishments for the poorest of the poor (Lele 1981; Fu et al. 2022), but rather they are institutions for farmers with cognitive skills and resources to engage with complex business models. Thus, this draws attention to a crucial debate that, although education promotes market integration and cooperative efficiency (Chagwiza et al. 2017; Korgitet 2019), it also runs the risk of isolating and neglecting the less educated smallholder farmers who are more vulnerable. In both case studies, the model further indicates that farmers' level of education exerts a monotonic gradient in cooperative membership intention. Relative to a farmer having no formal education, the probability of intending to join increases from primary up to tertiary level. This pattern is consistent with literature on the role of human capital in cooperative formation across SSA (Wollni & Zeller 2007; Bernard et al. 2010; Mojo et al. 2017).

Results concerning the indicators of commercial scale activities among farmers in Nigeria, such as the cashew trees population (captured using the number of cashew trees), hired labour, and reliance on cashew as major income source, indicates readiness for market oriented-farming or a farmer with commercial potential. These farmers have moved beyond subsistence farming, operating as small-scale entrepreneurs. For these type of farmers, participation in cooperatives is not just seen as a survival mechanism but a strategic business decision for growth, scaling-up and mitigating market risks. According to authors like Agwu et al. (2013) and Owusu & İşcan (2021) in their study on Nigerian agricultural enterprises, the intention to commercialize is a powerful driver of collective market action. According to the study by Agwu et al. (2013) among smallholder farmers in Nigeria, membership in a cooperative society was found to be a significant determinant of a farmers' level of commercialization. This suggests that cooperative structures are directly associated

with market-oriented production. This finding is further echoed by Owusu & İşcan (2021) analysis on households across Nigeria and Tanzania who echoed that resource endowment, such as land or farm size and labour, as well as a focus on cash crops, are key determinants that significantly increase the likelihood of a farmer transitioning from small-scale farming to commercial, market-oriented production. These findings suggest that farmers with commercial inclination are more likely to view participation in formal associations like cooperatives as avenues to improve market access and obtain institutional support necessary to sustain commercial activities producers (Kolade et al. 2014; Kehinde et al. 2025). On the other hand, the absence of significant effect of indicators of commercial-scale readiness among respondents in Kenya does not imply a lack of commercial agriculture in the region but suggests that the barriers to cooperative participation intention among farmers may not necessarily be economic or scale-based but rather suggests that major barriers may lie in human and social capital (Crescenzi et al. 2013; Poole & Donovan 2014; Koutsouris & Zarokosta 2022), as revealed in key results in the Probit analysis.

Furthermore, results from Probit regression carried out in Nigeria show the significant influence of age on cooperative participation intention. This emphasizes the power of social hierarchy in facilitating modern collective action. This reflects Nigeria-specific dynamics, such as older farmers' greater asset accumulation and hence, the ability to make equity payments (Mbagwu 2018; Popoola 2020), the need for age-related labour-saving needs (Usman et al. 2022) and perhaps stronger social capital and trust to work cooperatively within the communities (Markelova & Meinzen-Dick 2009). This suggests that in the Nigerian context, cashew cooperatives may function as institutions to reduce the perceived risks and endorse new technologies and institutions for ageing farmers, which may be particularly important for high-value perishable crops that are prone to susceptible side-selling. In contrast to the positive findings on age among Nigerian cashew farmers, the results in Kenya show no significant effect of these variables on cooperative membership intention. This challenges the assumptions about generational gaps, potentially reflecting the valued experience in cashew farming across age groups (Koech et al. 2016).

Regarding the influence of the gender variable on farmers' intention to participate in a cooperative, results show that female cashew farmers in Kenya exhibit a significantly stronger intention to join than male farmers. This reveals how cooperatives function as a tool for empowerment, giving women more economic power and independence in an evolving institutional context. Although the gender variable according to the probit regression model shows statistical significance regarding farmers' intention to join, it cannot be viewed in isolation as it is inherently connected to the structural barriers women face regarding unfair land tenure systems, restricted access to credit, as well as exclusion from formal market channels, which limit their bargaining power (Doss & Kieran 2013). To directly counter such structural

barriers, cooperatives create a space where all members, regardless of asset ownership, can collectively achieve economies of scale by pooling resources and negotiating better prices with buyers. These findings align with the work of Fischer & Qaim (2012) who argued that collective action often yields proportionally greater benefits for women by providing a platform to avoid restrictive social norms and to access resources typically controlled by men. Nevertheless, this gender effect on farmers' intention to join cooperatives must be interpreted along with other significant drivers of social capital and communication channels. This suggests a synergistic relationship in which women farmers who may be systematically excluded from informal, male-dominated information networks rely on more structured, formal sources of agricultural information and on institutional linkages to make informed decisions. The significant effect of the variable in Kenya, as opposed to the results in Nigeria, likely shows a more robust policy environment that has actively promoted gender equality programming (gender-responsive policies) in agriculture, which fosters a stronger civil society advocating for women's equal access to economic resources and opportunities (Oduol et al. 2017; Lomong et al. 2023). Hence, the cooperative model in the Kenyan cashew sector is not just an economic institution but a transformative one. It actively advances gender equity by enabling the integration of women farmers into the export-oriented value chain. This is a crucial lever for enhancing the livelihood of individuals and also the sector as a whole (Njuki et al. 2016).

6.3. Psychological Determinants of Cooperative Membership Intention

The application of the extended TPB facilitated the understanding of how farmers consider the intention behind cooperative membership. It shows similarities and some intriguing dissimilarities in what determines their intentions. Data collected from Kenya indicated that knowledge about cooperatives was the most significant direct predictor of intention, with the construct accounting for a significant share (40%) of the variance. This suggests that understanding the benefits of cooperatives (that is, resource sharing, price stabilisation, and market access), governance structures and potential risk factors is crucial to farmers' intention to join cooperatives (Zeweld et al. 2017; Adnan et al. 2018; Möllers et al. 2018). While knowledge was a significant construct predicting intention to join cooperatives in the Nigerian context, it was more modest in its direct influence on intention relative to Kenya. Instead, it greatly influenced intention indirectly. The impact of this construct was primarily channelled indirectly by shaping attitudes and subjective norms, contrary to the common assumption within behavioural science literature that increased knowledge

directly enhances behavioural intentions (Lei et al. 2024). This difference can be attributed to the variations in the first awareness about cooperatives, their roles and functions (Kehinde et al. 2025), prior negative experiences (Adesanya et al. 2021), or how the information about cooperatives and their functions was shared (Apata & Yusuf 2022; Obianefo et al. 2023). Nevertheless, a consistent finding is that knowledge is a prerequisite to positive intention, though perhaps insufficient by itself to influence farmers intention to participate in cooperatives (Hayden et al. 2021). It enables farmers to decide intelligently, getting away from a past mistrust (Miroro et al. 2023) and enabling the perception that membership is more valuable in an intricate cashew value chain (Möllers et al. 2018).

Social influence played a significant role in both case studies, although their relative strength differed. In Nigeria, Subjective Norms (in terms of farmers' perceived expectations from peers, community leaders, family, and notably, agricultural experts) emerged as the strongest direct predictor of intention. This highlights the crucial influence of the social environment, validating TPB's core emphasis. Additionally, the significant effect of formal social capital as a formal agricultural information source further expands the growing importance of technical knowledge, which is needed to meet the demands in the export market (Skaalsveen et al. 2020; Bao et al. 2022; Moritz et al. 2023). This finding is consistent with Githinji et al. (2024) study in Kenya, where the demands of powerful social actors, including family relationships, state policies, and religious organisations, primarily influenced farmers' land-use choices. On the other hand, results from the Kenya case study also indicated significant, although secondary (compared to Knowledge), roles for both Subjective and Moral Norms. According to authors such as Awotide & Awoyemi (2015) and Nkurunziza & Habimana (2021), the high influence of these norms in both countries indicates that cooperative participation is rooted deeply in social contexts. Hence, farmers' intentions for cooperative membership are influenced by what significant individuals think and do, driven by trust, reciprocity, or fear of exclusion (Lynne et al. 1995; Hernández-Espallardo et al. 2013). This social validation is crucial in high-risk export sectors requiring coordination and mutual accountability (Abebaw & Haile 2013). However, these norms can also reinforce exclusion if cooperative leadership is perceived as elitist, demanding inclusive governance aligned with local moral economies (Nkurunziza & Habimana 2021).

Positive Attitudes towards cooperatives (motivated through perceived economic advantages such as improved prices, access to markets, stable incomes) and Behavioural Control (confidence of having sufficient resources, time, and capacity to participate successfully) were significant predictors in both contexts. However, it has lower total effects than the leading Knowledge or Subjective Norms construct. This indicates that positive attitudes come from farmers' perceived benefits of the cooperatives (Ofori et al. 2019; Ahado et al. 2021), while negative attitudes could

come from farmers' prior experiences of mismanagement and non-transparent dealings within cooperatives or other farmer groups (Miroro et al. 2023). Also, farmers who perceive that they have adequate resources are more likely to feel capable of joining and participating in cooperatives (Augusto et al. 2019; Ara et al. 2021). According to authors like Grashuis & Ye (2019) and Kalogiannidis et al. (2024), these attitudes reflect the expected tangible benefits from cooperative membership, while PBC indicates the practical barriers, for instance, membership fees, time constraints, and access to support, that can make membership look and feel aspirational instead of achievable, especially for farmers who are resource-poor (Verhees et al. 2015; Zheng et al. 2023). Notwithstanding, their consistent significance indicates that farmers need both a positive perception of the benefits and a belief in their own capacity to engage successfully.

For both Kenya and Nigerian case studies, the interplay among these constructs highlights the complexity of farmers' cooperative membership intentions. For instance, in Kenya, Knowledge directly influences intention and sways attitudes, subjective norms, moral norms, and perceived behavioural control, while in Nigeria, the major influence of the Knowledge constructs on intention is its indirect impacts on other critical constructs (attitude, perceived behavioural control, and subjective norms). This key result highlights the need for a holistic approach in policy interventions aimed at promoting cooperative membership intentions among smallholder farmers. This means that while knowledge is an important predictor of farmers' intention for cooperative membership, it singlehandedly may not be sufficient to drive cooperative participation among the intended farmers. According to authors such as Hayden et al. (2021), farmer decision-making happens in complex contexts where decisions are influenced by not only economic considerations but also social, psychological, and environmental factors. The authors believed that farmers' decision-making process cannot be fully explained by focusing solely on financial benefits. Instead, these choices are greatly influenced by factors related to their identity, emotional connection to the land, social demands, planning for future generations, and individual principles. In addition, Bagheri et al. (2019), Maleksaeidi & Keshavarz (2019), and Govindharaj et al. (2021) believe that while knowledge plays a significant role in shaping farmers' behavioural intentions, it primarily exerts an indirect influence on their decisions by shaping attitudes, subjective norms, and perceived control over behaviour.

6.4. Robustness of the Ex-TPB Model

Taken together, the findings from the ex-TPB reported above provide grounds for considering the extended TPB model employed in this study as a robust

explanatory framework for cashew cooperative membership intentions in the two study contexts. Three converging lines of evidence support this claim. First and foremost, the measurement and structural models satisfied the conventional psychometric thresholds, where composite reliability (CR) values for all latent constructs exceeded 0.70 and AVE values exceeded 0.50 (Fornell & Larcker 1981). Also, the structural model yielded fit indices (CFI = 0.955, TLI = 0.945, RMSEA = 0.047, SRMR = 0.069 for Kenya, and CFI = 0.965, TLI = 0.959, RMSEA = 0.050, SRMR = 0.060 for Nigeria) at or above the cut-offs recommended by Hu & Bentler (2009), with an intention R^2 of 0.291 in Kenya and 0.345 in Nigeria. Secondly, the two added constructs, namely knowledge and moral norms, each contributed statistically significant paths to behavioural intention beyond the original TPB predictors of attitude, subjective norms and perceived behavioural control (original model in Appendix E and Appendix J for Kenya and Nigeria, respectively), and their inclusion increased the explained variance in intention by $\Delta R^2 = 0.035$ (0.291 - 0.256) in Kenya and $\Delta R^2 = 0.041$ (0.345 - 0.304) in Nigeria, relative to the baseline model (see Appendix I and Appendix J for baseline model for Kenya and Nigeria, respectively), indicating that the extension is not merely permissible but substantively informative. Thirdly, this extension is consistent with other literature in agricultural TPB research such as Bagheri et al. (2019) and Maleksaeidi & Keshavarz (2019) who have both demonstrated that the addition of knowledge-based and moral-normative constructs improves predictive power in smallholder contexts characterised by information asymmetries and strong communitarian norms. Based on the above, the convergence of the internal psychometric evidence, the incremental explanatory gains (ΔR^2), and also the alignment with extensions of the TPB model in other literature in comparable contexts therefore justifies treating the extended TPB deployed in this thesis as methodologically and theoretically valid.

6.5. Gender, Information Sources and Delivery Channels

A finding worth clearly setting up before presenting the chi-square results is that the probit regression for Kenya found that being a woman was positively associated with the intention to join a cashew cooperative, making the subsequent communication results all the more important to interpret carefully. Women in Kenya are more motivated to join, yet the analysis below shows that they face structural communication barriers that constrain their access to information about cooperatives and their ability to act on that motivation. These two findings together, rather than cancelling each other out, actually point to a group of farmers with high latent demand

for cooperative membership who are systematically under-served by current information systems.

The chi-square analysis for the third objective clearly shows that a farmer's gender does not significantly shape farmers' information sources or delivery channels in both case studies, with all phi coefficients falling below the conventional small-effect threshold of 0.10 and p-values consistently exceeding 0.05. The only marginal exception is farmer events in Kenya, where a weak association was observed ($\chi^2 = 3.581$, $p = 0.058$, $\phi = 0.120$). When taken at face value, the results do not support our third hypothesis (H3) while also appearing to contradict a substantial body of literature that documented systematic gender-based disparities in agricultural information access across SSA (Doss & Morris 2000; Ragasa et al. 2013; Peterman et al. 2014; Mudege et al. 2017). However, the descriptive distributions underlying these tests exhibit patterns that warrant closer discussion, particularly in Nigeria.

The most surprising feature of the Nigerian data is that women show a notable preference for private experts/officers and private extension workers as information sources, sources that are categorised within formal, institutional networks and that, in many rural sub-Saharan African settings, operate on a fee-for-service basis, providing paid technical advice and field visits (Anderson & Feder 2007; Christoplos 2010). This directly contradicts what the broader literature on women's information access would predict, namely, that women rely predominantly on informal, interpersonal sources within their immediate social circles because of mobility constraints, lower institutional connectivity, and, importantly, restricted access to financial resources (Nlerum et al. 2012; Ragasa et al. 2013). If women face restricted cash liquidity, as the literature and the structural context of this study suggest, why would they pay for formal advisory services rather than turn to free informal sources from neighbouring farmers or friends? One plausible answer lies in the nature of those free sources themselves. Neighbouring farmers and friends, the bonding capital sources, are typically operating at the same level of knowledge and experience as the person seeking advice. They face the same challenges, use the same practices, and have access to the same information. In that sense, they offer social support and solidarity but not the technical depth that cashew production increasingly demands. Private experts and officers, by contrast, bring specialised knowledge about agronomic practices, input quality, and market requirements that farmers cannot get from within their own social circle. For women who are already navigating significant structural constraints, paying for that kind of targeted, high-quality advice may simply be the more rational choice, not despite their resource limitations, but because of them. The cost of acting on bad or insufficient information, whether through crop loss, poor input decisions, or missed market opportunities, can far outweigh the cost of a paid consultation.

This apparent contradiction points to an important and underexplored dimension on intra-household financial decision-making in agricultural households. The finding raises the question of how agricultural advisory budgets are allocated within households, and who ultimately controls the spending on farm-related information seeking. At least, three distinct mechanisms could help understand this pattern observed in the study. Firstly, in many West African agricultural households, women manage independent income streams, particularly from produce marketing and small-scale trade, and make autonomous decisions about how to spend those earnings on farm-related activities (Doss 2006; Whitehead & Tsikata 2003). In Nigeria, women's long-standing participation in market trade, including in cashew marketing and value chain, means that a portion of female farmers may have direct control over money that they can independently allocate toward paid agricultural advice. Secondly, female-headed households, which are not uncommon in SSA, provide women with full household budget authority, including for agricultural expenditure (FAO 2011; Milazzo & van de Walle 2017). Thirdly, and perhaps the most common in practice is that women farmers may access paid advisory services using resources allocated by a male household head, either because he has explicitly directed them to seek advice on his behalf or because seeking formal paid advice carries his assumed approval as a legitimate agricultural activity, even where women's independent expenditure on other items remains constrained (Quisumbing & Maluccio 2003; Fletschner & Kenney 2014). In this third scenario, women may appear as the agents who physically access the information, but the financial decision and the direction to seek it may originate with the household head. Whichever pathway applies, our findings complicate the straightforward narrative that women's restricted cash limits their access to formal services, and suggest that the relationship between women's financial agency and information-seeking behaviour is more situation-specific than aggregate measures of "cash liquidity constraints" can capture.

In Nigeria, the descriptive patterns raise a different and equally important point. Women in the Nigeria sample notably do not report friends as an information source, which stands in contrast to the Kenyan pattern and to the general predictions of the literature. This absence cannot easily be explained by greater overall access to information. Rather, it may reflect the situation of shared knowledge deficit among women farmers in these communities, where they are aware that other women in their immediate circle or network also have limited information or knowledge concerning cashew markets and prices, as well as cooperative opportunities, which makes peer consultation even less useful (Nlerum et al. 2012; Balasha et al. 2024). In other words, the non-use of friends as an information source may itself be a signal of informational exclusion rather than informational adequacy. Women may instead move toward private experts and extension officers because these sources are perceived as holding knowledge that their immediate peer group cannot provide. The marginal significance

of farmer events in Kenya further supports this picture where men are somewhat more likely than women to attend structured group events which is consistent with documented patterns of women facing scheduling conflicts due to domestic responsibilities and also cultural norms that limit sustained public participation (Agarwal 2010; Doss et al. 2015; Lambrecht et al. 2014). Hence, the training for of delivery channels shows no significant gender difference, which suggests that where training is well-targeted, accessible, and practically relevant, it can reach male and female farmers equally, pointing to the importance of how training is designed and delivered rather than simply whether it exists.

In Nigeria, telephone usage as a channel is the top delivery method among female cashew farmers and this connects directly to a set of literacy-related factors that our quantitative chi-square tests cannot fully capture. For women farmers with lower literacy levels, verbal and oral communication channels are not merely preferred and used, but they are functionally important as written materials, formal documentation, or technically phrased advisory content usually requires a level of literacy that a significant proportion of rural women do not have access to (Sabharwal et al. 2020; Nlerum et al. 2012). A telephone call to a trusted contact, whether a private extension worker, a peer, or a discussion with a family member, will offer something that formal written channels cannot, and this allows the farmer to communicate in informal, colloquial language, to ask the same question multiple times, and to receive a response calibrated to what she has actually expressed rather than to a standardised advisory format. In this regard, the telephone functions as a mitigation strategy for literacy barriers as much as it does a straightforward communication tool. Much of this informal information exchange among Nigerian women also takes place within the activities of daily life rather than in purposefully dedicated information-seeking moments. The market, where many Nigerian women spend extended hours trading, functions as a key setting for price information and group membership discussions to circulate organically. According to authors, church gatherings in Christian communities as well as communal spaces in Muslim contexts similarly serve as informal but structured social environments where information on agricultural activities and beyond travels through conversation (Amaechi & Ossai-Onah 2015; Rodriguez et al. 2015).

These patterns collectively suggest that the non-significant chi-square results should not be treated or understood as evidence of actual gender neutrality in information access. What they more likely reflect is that the quantitative measurement approach used for the study, which captures farmers single most used source and channel, only focuses on the endpoint of information acquisition while remaining blind to the process, the social context, the financial conditions, and the literacy constraints that shape how that endpoint is reached. The export-oriented nature of cashew production likely adds another flattening effect as traceability and quality

standards may impose universal information requirements on all producers regardless of their gender, the formal categories of sources and the delivery channels involved, even where the mechanisms and ease of access differ substantially (Farnworth et al. 2013; Doss et al. 2015). Hence, the export market acts as a surface-level leveller without fully addressing the structural barriers in communication that shape women's actual experience of information access which includes time poverty from domestic responsibilities, constrained decision-making authority within households, and limited public mobility in culturally conservative settings (Meinzen-Dick et al. 2014; Peterman et al. 2014). Equal reported access to information sources and channels does not mean equal capacity to act on that information or equal participation in the cooperative structures that depend on it.

6.6. Theoretical Implications for the Study

Beyond the empirical and practical findings set out above, the evidence in this thesis supports four theoretical implications, each of which refines or extends an established framework in a direction that, according to available literature, has not previously been articulated for cashew cooperative formation in SSA.

First and foremost, extending the TPB with knowledge and moral norms, based on context, proved to be more than a methodological convenience. In the Kenyan case, the knowledge construct emerged as the strongest direct predictor of intention which accounted for approximately 40 percent of the explained variance. In the Nigerian case study, the same knowledge construct operated principally as an indirect determinant of cooperative membership intention through attitudes and subjective norms. Of note, the original three-predictor TPB model of attitude, subjective norms and perceived behavioural control is unable to capture this outcome. Therefore, the theoretical implication is that Ajzen's (1991, 2011) original TPB model is empirically insufficient and underspecified for cooperative membership intentions in settings that are characterised by information asymmetry and historical distrust of institutions, and that its extension with knowledge and moral norms based on available context is not optional in such settings. This is consistent with studied by Senger et al. (2017), Bagheri et al. (2019), Maleksaeidi & Keshavarz (2019), who reached similar conclusions in adjacent smallholder contexts, and the present thesis now extends that line of reasoning into the African cashew export sector.

Second, and probably the most interesting and novel insight the thesis provides is the varied behaviour of bridging social capital (i.e. formal information sources) in both case studies. Although the bridging social capital effect on intention was significant and nearly identical in both case studies (0.188 in Kenya and 0.187 in

Nigeria), the path through which it was realised differed in the two contexts. In Kenya, formal channels of communication mattered, with formal channels carrying a significant 14.1 percentage-point advantage over informal ones. On the other hand, while the channel effect in Nigeria was statistically insignificant, what mattered was the credibility of the human source through which the information was passed. When compared to the studies of Putnam (2000) and Woolcock & Narayan (2000), the divergence in results observed in this thesis supports the proposition that the mechanism through which bridging ties convert information received into collective action is endogenous to the institutional trust environment in which those ties are embedded. Where institutional trust is weaker, the credibility of a trusted individual appears to substitute for the legitimacy that institutions would otherwise provide. This finding is also consistent with Granovetter's (1973) thesis on the strength of weak ties and with Narayan's (1999) distinction between bonds and bridges, and it extends both arguments into the specific domain of agricultural cooperative information flows in export-oriented African value chains.

Third, the joint use of RUT and the extended TPB in this thesis yielded an explanatory account that neither theory would have produced alone. While the RUT captured the structural and economic constraints that shape the observable choice set available to a smallholder farmer, such as farm size, degree of commercialisation (captured as the number of cashew trees available on the farm), and access to formal and informal information sources, the extended TPB then accounts for the cognitive and normative factors that determine which of those feasible courses of action the smallholder ultimately chooses. When treated separately, each theory leaves a systematic variance unexplained. However, when the frameworks are modelled together, they account for the observed patterns comprehensively. This agrees with the long-standing argument (Lynne et al. 1995; Ostrom 2000; Williamson 2000) that economic and socio-psychological theories of agricultural decision-making are explanatorily complementary rather than mutually exclusive, and it offers an empirical demonstration of that synergy in an SSA cooperative formation context where applications of multi-theoretical frameworks are still scarce.

A more cautious but theoretically significant observation in this thesis concerns the relationship between gender and agricultural information access. The chi-square tests of independence for both Kenya and Nigeria showed no statistically significant association between gender and either most used information source or most used delivery channel, with all phi coefficients falling below the conventional small-effect threshold of 0.10. Of note, the present study was not primarily designed as a gender analysis, and this observation should therefore be treated as exploratory rather than conclusive. Nevertheless, the finding introduces two important theoretical tensions that go beyond simply noting the absence of significant differences.

The first tension concerns what the non-significance actually hides. In Nigeria, the descriptive statistics show that women farmers report notable use of private experts, private extension workers, and other fee-based formal advisory services, which are sources embedded within institutional networks rather than the informal peer circles that the broader literature predicts women farmers predominantly rely upon (Ragasa et al. 2013; Nlerum et al. 2012). This is unexpected and requires theoretical attention as it sits in direct contradiction to the widely documented assumption that women's restricted cash liquidity moves them toward free informal sources. This finding points toward an undertheorized dimension in the gender and agricultural information literature concerning the allocation of financial resources within households for the specific purpose of information seeking. Whether women in these communities exercise independent financial agency over advisory budgets, access paid services with the explicit or assumed consent of a male household head, or represent a segment of female-headed households with full budget autonomy is not determinable from the findings of this study. Notwithstanding, the findings from this study suggests that the standard assumption linking women's cash constraints directly to their most used information source may require contextual qualification especially particularly in export-oriented crop settings like cashew and other similar cash crops where the agricultural information market itself includes fee-based actors.

The second tension concerns the absence of friends as an information source among women cashew farmers in Nigeria. Rather than indicating adequate access through other routes, the pattern observed in our study more arguably reflect a shared knowledge gap within women's peer networks where women farmers do not consult friends because they understand that other women in their network or circles are similarly uninformed about cashew markets and cooperative opportunities (Nlerum et al. 2012; Balasha et al. 2024). This is a qualitatively different situation from informational exclusion of women farmers and one that the model adopted in this study (chi-square framework) cannot distinguish from genuine channel convergence. Together, these two country-specific observations extend the theoretical claim beyond the simpler interpretation that export-oriented systems level gender-based communication differences. It rather suggests that equal reported access at the level of survey categories can coexist with clearly gendered information-seeking logics, financial dynamics, and also collective knowledge deficits that manifests underneath the surface of statistical neutrality. The findings from this study are therefore advanced here as directed research questions for future work rather than settled theoretical conclusions, and they invite a reconsideration of how gender is theorised and measured in agricultural information access models applied to export commodity contexts.

6.7. Limitations of the Study

While this study provides important understanding on the factors influencing cooperative intention among cashew farmers, several limitations must be acknowledged. These limitations demand careful consideration to contextualize the findings of the study. Firstly, the operationalization of the key variables of the study while crucial for model specification may have unintentionally oversimplified complex realities. For instance, the measurement of social capital by identifying farmers most used agricultural information source to create a clear type of either bonding (i.e. informal information sources) or bridging (i.e. formal information sources) social capital does not capture the complex nature of social networks among rural farmers. Of note, farmers certainly acquire information from multiple, overlapping sources and a model capturing the variety or intensity of these networks might provide a more robust understanding of the influence of social capital on farmers intention to participate in cooperatives. Additionally, while farmers may have contacted formal sources of agricultural information such as extension officers or input dealers, they certainly have unrestricted access to information sources such as family members or neighbouring farmers. Similarly, the means of communicating with agricultural information source which is reduced to a single, binary variable as formal and informal channel, may mask the complementary ways a single farmer uses multiple channels for communicating with information source.

Secondly, while the probit model tried to capture important variables that could predict farmers intention to join cooperatives, it may have omitted other crucial factors. The model focused primarily on core set of farm, household and institutional variables, ignoring other crucial structural economic factors such as price volatility of export-related products, investment or upfront costs associated with production, farmers availability and access to credit, or even the quality of local market infrastructure, which could significantly influence livelihood decisions such as cooperative participation. The omission of these variables suggests that while the model is a good fit, it may not fully capture the economic aspect of farmers' intention to join. Additionally, while the sample size was sufficient for the analysis carried out, a larger dataset could have provided greater statistical power which allows for complex SEM techniques and potentially using SPSS AMOS software package which more suitable for larger datasets. Additionally, another limitation of the probit model concerns the educational attainment distribution in the Kenya case study. The category for tertiary education in the no-intention group is rather small (n=1) which produces a wider standard error around the estimate for tertiary education than around the primary and secondary estimates.

Lastly, challenges exist in data collection, particularly in Kenya, where interviews were carried out in Swahili with the help of local interpreters, which could

have introduced semantic information being lost, thus affecting the accuracy of the data collected. Of note, these limitations do not discredit or invalidate the core findings of this study, but it highlights the complex nature of the methodology and data collection, providing a clear roadmap for more granular and controlled future research.

To mitigate the limitations of the research methods and to enhance the accuracy of study's results, several strategies were incorporated in the early stages of the research. Firstly, an extensive pilot study was carried out in two target areas (one for each case study) before commencing full data collection process. This played a crucial role in ensuring that our research tools were appropriate and fit for regional conditions, allowing us to fine-tune questions regarding cooperative membership intentions in the study area. This method clearly affected the choice to use slightly modified analysis models in Kenya and Nigeria. The aim was for the research techniques to be context-aware and adaptive to local realities instead of enforcing a rigid style of one-size-fits-all framework.

In addition, in-depth interviews were carried out with key informants such as local district/country agricultural officers, key agricultural advisors, extension officers, and cashew farmers in both countries during the initial pilot study phase. This was done primarily to build contextual understanding of the local farming environment and to inform the design of the survey instruments appropriate to each setting. The insights gathered at this stage were very important in identifying location-specific challenges and perspectives related to cooperative membership, ensuring that the questionnaire adequately captured the actual experiences and realities of farmers in both Kenya and Nigeria rather than imposing externally derived assumptions onto the data.

Lastly, in terms of the distribution of educational attainment, to address this, education was retained as a categorical predictor with three indicator variables (primary, secondary and tertiary), with no formal education as the omitted reference category rather than being collapsed into a binary or treated as an arbitrary continuous variable so that the better-populated cells were not contaminated by the smaller tertiary cell. The interpretation of this result was therefore framed around the broader monotonic pattern that any formal schooling significantly increases the probability of cooperative-membership intention in both case studies, with the precise gradient between secondary and tertiary in Kenya treated as suggestive rather than definitive.

7. Conclusions and Recommendations

7.1. General Conclusions

This integrated study of Kenya and Nigeria shows that access to and the quality of information drives cooperative participation intention in the African cashew export value chains. Results from both countries illustrate this core understanding, but their specific histories, institutions, and socio-cultural factors determine how information is processed and acted upon.

Aside from justifying the robustness of the expanded TPB model to study cooperative membership intentions among farmers, the study highlights that the intention of farmers to join export-oriented cooperatives, for example cashew cooperatives, is shaped by a combination of social capital, communication channels, farm and household factors, and psychological variables. Yet, the intention to join is largely context-dependent. In both case studies, formal social capital in terms of farmers access to information through bridging networks emerged as a dominant driver which highlights that trust in institutions like extension services or agricultural experts is crucial to mitigating the perceived risks of collective action. In both case studies, the experience of collapsed socialist-era unions creating deep institutional distrust (in Kenya) and the issues of lack of transparency and trust (in Nigeria), makes formal social capital the primary validator of cooperative legitimacy. Farmers rely on and trust experts guidance, not just for information, but for social proof to overcome scepticism. However, a crucial divergence is observed in how trust is developed. The formality of communication channel itself is an important factor that legitimizes information in Kenya while the credibility of the information source overrides the mode of information delivery in Nigeria. This highlights the fundamental difference in development of institutions and how farmers process information. These results are not incidental but reflects the core aspect of the regions focus on agricultural development through cooperative activities.

The farm and household factors of farmers' intention to join reveal interesting findings in both case studies. Intention of cooperative membership in Nigeria is characterized by commercially-ready farmers (in terms of older, established farmers with larger farms and focus on a single crop as main income source) whom cooperatives represent an avenue for business expansion or upgrade. On the other hand, the result in Kenya reveals an inclination among women and educated farmers who see cooperatives as avenues to overcome structural barriers and achieve full market integration. Therefore, this positions cooperatives as an institution for integrating existing commercial success in Nigeria, while they act as a transformative institution for economic inclusion and equity in Kenya.

The application of the expanded Theory of Planned Behaviour reveals the universal and culturally-specific importance of psychological drivers in predicting cooperative membership intentions. The knowledge construct about cooperatives was the most crucial factor predicting intentions in Kenya which emphasizes that a clear understanding of cooperative benefits and governance is a primary catalyst for participation. On the other hand, the result from Nigeria emphasizes the role of subjective norms, that is, pressure from peers, family members and experts, as the strongest influencing factor predicting intentions to join. This stresses the dominance of the social environment over knowledge in farmers intentions to participate in cooperatives. Crucially, across both contexts, attitudes and perceived behavioural control were significant predictors of intentions, proving that farmers need to see economic and tangible benefits as well as feel capable of participating in cooperatives. In Nigeria, the knowledge variable functions primarily by shaping intentions indirectly through other constructs, rather than directly. This emphasizes that while educational campaigns are important everywhere, in Kenya they can directly increase participation in cooperatives whereas in Nigeria, they must first be directed through trusted social individuals or influencers to effectively alter attitudes and social norms that may block participation.

In terms of the gendered dimension of cashew farmers' information sources and delivery channels in Kenya and Nigeria, the results reveal largely non-significant differences in both case studies. No statistically significant association was found between farmer gender and either most used information source or most used delivery channel in either country, and the data therefore did not support H3. The broader literature on gender and agriculture has established observable disparities in information access, given the structural disadvantages women farmers continue to face across sub-Saharan Africa. However, such disparities did not emerge clearly in either case study or in either dimension of communication examined here.

One possible explanation is that the strict traceability and quality requirements imposed by export-oriented cash crops as observed in the cashew value chains creates a near-universal information demands, where what the market requires farmers to know effectively hide gender-segmented information patterns that are more visible in the context of domestic market crops. In this sense, the export market acts as a surface-level leveller that temporarily compresses the channel-based segregation typically observed elsewhere. However, this statistical neutrality should not be mistaken for functional equity.

Two descriptive patterns complicate the picture in important ways. In Nigeria, women show a notable preference for formal and fee-based advisory sources, including private experts and extension workers. This sits in direct tension with the assumption of restricted cash liquidity and it raises unresolved questions whether intra-household budget allocation for agricultural information seeking, specifically

whether women in these communities exercise financial autonomy over advisory budgets, they just act with male household consent, or reflect the circumstances of female-headed households. In Kenya, the absence of friends as a reported information source among women cashew farmers likely reflects the situation of a shared knowledge deficit within women's peer networks, a pattern that looks like channel convergence in the data but may represent a situation where women have collectively limited exposure to cooperative and market information.

Equal reported access to information sources and channels is therefore not the same as equal capacity to act on information received. Literature shows that women farmers continue to face structural communication barriers which is rooted in time poverty from domestic responsibilities, constrained decision-making authority within households, limited public mobility shaped by cultural norms, and, in many cases, lower literacy levels that affect which channels are functionally accessible to them. Our findings therefore complicates, rather than overturn, the established knowledge on gendered exclusion from agricultural information. It clearly shows that equal access at the level of reported categories does not, by itself, deliver equal participation or economic outcomes. This distinction has direct practical implications for how cooperative promotion strategies should be designed in both countries.

7.2. Recommendations

In order to promote cooperatives, policymakers and development partners must give up one-size-fits-all approaches and allocate responsibilities clearly between national regulators, subnational agriculture authorities, extension services, and (where engaged) exporters/processors. In Nigeria, state ministries of agriculture, cooperative development/registrar bodies where they exist, and local government agriculture desks should design strategies that deliberately use existing social hierarchies, structures and commercial networks. This involves these agencies investing in resources that helps to identify and enrol respected leaders as well as large-scale commercial farmers as supportive partners in cooperatives with donors funding pilots only alongside a named governmental or accredited implementing partner for delivery and oversight. These leaders endorsing cooperatives will serve as the most credible marketing tool after which information can flow through formal and informal channels.

In Kenya, departments of agriculture and ward extension structures at the county level should lead implementation, supported by NGOs where needed. Here, the promotion of cooperatives by county extension units and cooperating unions must be channelled through structured, formal systems, backed by national cooperative standards/templates where applicable. This involves using both formal agricultural

information sources and delivery channels to raise awareness concerning cooperative benefits and functions. Furthermore, investments should focus primarily on expanding high-quality, participatory trainings and farmer events that details out cooperative governance, its benefits and also the rights of members. These events should not only act as sessions for information but as a crucial trust-building exercise that provide legitimacy of cooperative and can be verified through attendance records and standardized curricula.

In order to address the distinct psychological pathways that influence membership intentions, public extension systems (such as Kenya county extension; Nigeria ADP/extension services supported at state/local level) must move beyond generic awareness campaigns to targeted interventions whose delivery agency is explicit. In Kenya, county extension managers should focus on increasing direct farmer knowledge using simple and accessible materials such as visual guides that clearly show tangible benefits, costs, and success stories of cashew cooperatives. In Nigeria, ministries/agencies supervising agricultural extension and those working with LGAs should integrate educational initiatives within social contexts. Knowledge about cooperatives should be disseminated through important figures identified in the subjective norms construct. Funding partners may support content development, but trainings should be provided to extension officers, local community leaders and other respected experts as a formal “train-the-trainer” chain so they can correctly and convincingly promote the cooperative model, thereby indirectly shaping farmers’ attitudes and confidence through trusted voices with supervisory monitoring of outreach (who trains whom and coverage rates).

The probit result showing that women farmers in Kenya are more likely to express an intention to join a cashew cooperative alongside the structural communication barriers they face which includes time poverty from household duties, limited public mobility, and even constraints on financial agency regarding membership fees, all call for timely and practical measures that cooperative-promoting bodies and county or state governments implement jointly. Cooperative and unions leaders, county gender, youth, and equity units where these are operational should promote model bylaws and governance structures that meaningfully support the representation of women in management committees, with a minimum target of 30% female representation at both committee and general membership level as a starting benchmark. In addition to this, practical operational interventions should be specified in project workplans and cooperative annual plans, such as scheduling meetings at times and locations accessible to women with caregiving responsibilities, childcare arrangements during training sessions, and developing literacy-appropriate learning materials that do not assume written fluency, can substantially reduce structural barriers to participation.

Finally, county or state monitoring and evaluation units, supported by national agriculture statistics or cooperative registries and for donor-funded pilots, independent third-party monitoring, should track the effectiveness of interventions by utilizing measures like the percentage of members who report increased confidence in cooperative governance, progress in closing the gender gap in leadership roles, and expansion of smallholder membership in targeted groups. Additionally, national ministries of agriculture as well as cooperative development agencies can strengthen inclusive market integration by focusing on empirically validated levers, training efficacy, social validation, gender-responsive barrier reduction and institutional transparency, each tied to a lead institution and a small set of verifiable indicators.

7.3. Suggestions for Future Studies

To build upon the research and address limitations, future studies should incorporate a comprehensive and dynamic approach in order to expand upon this research and solve its limitations. This could be achieved by broadening the research scope to include more countries besides the research locations. This could involve countries that also grow cashews and prioritise cashew and its value chain, such as Mozambique, Tanzania, and West African countries, such as the Ivory Coast. This could ensure that results are context-specific and applicable across different agroecological and socioeconomic areas. These comparisons could also shed light on how different social and market structures in a region shape the level of participation in cooperatives, while also uncovering the structural and institutional drivers of high dormancy in cooperatives in SSA. Secondly, to understand how cooperative engagement changes in response to external shocks, such as price volatility or climate events, or even governmental interventions, longitudinal research that gathers data from the same cashew farmers over an extended farming period could reveal how intention and participation in cooperative engagement manifest over time.

The inclusion of variables like input cost, credit availability, and price risk in behavioural models could better reveal the constraints faced by farmers with regards to finance. In reality, these constraints could take precedence over drivers captured in this study, like attitude and norms. Using a mixed-method techniques which incorporate surveys and qualitative interviews, especially when it comes to gendered decision-making or intra-household dynamics that are often overlooked by quantitative data alone, could further reveal complexities than those explored in this study. For example, even if men and women farmers express similar preferences in terms of information sources, qualitative methods may reveal major differences in how men and women utilise that information, especially if there is a disparity in control of economic resources. Future studies should focus on assessing the complex

dimensions of information access in terms of frequency of access as a determinant to cooperative membership while also assessing the role of gender alongside additional farm and household determinants on its influence on farmers social capital means and delivery channels.

The observation on gender and access to agricultural information, and how this relates to cooperative membership, deserves a focused research agenda of its own. The chi-square results reported in this study are suggestive rather than conclusive, and they call for further work using designs purposely built to examine gender differences along multiple dimensions simultaneously. Four lines of enquiry are particularly important. Firstly, future studies should disaggregate "access to information" into its component parts, specifically in terms of exposure, comprehension, trust, and actual use, since statistical equality at the level of reported source or channel can coexist with meaningful inequality at deeper levels of information quality, processing, and action. Secondly, the intra-household dimension of agricultural information seeking requires dedicated attention. The finding that women in Nigeria report higher use of fee-based advisory services despite documented cash constraints raises questions concerning who controls the agricultural advisory budget in the households, and under what conditions can women spend independently on information, as well as how male household heads shape or direct women's information-seeking behaviour. Qualitative interviews combined with survey data would be far better suited to capture these dynamics than individual-level questionnaires alone.

Also, the pattern observed in the cashew sub-sector should be tested in other export crops such as cocoa, coffee, sesame, and shea, as well as in non-export staple value chains, to determine whether the result reflects a genuine feature of export-oriented agriculture or a cashew-specific pattern shaped by the particular structure of the value chain, its buyers, and its quality requirements.

Lastly, decision making in the household demand closer examination since even where men and women access the same categories of information sources and channels, the authority to act on that information within the household may still remain highly gendered. Therefore, household-level surveys combined with qualitative interviews are required to capture this dimension reliably, while a mixed-methods approach is strongly recommended for future work that seeks to determine whether the present findings represent a genuine shift in the gender architecture of agricultural information in African export value chains, or a sector-specific pattern that the broader literature must still accommodate.

While establishing general guidelines for collaborative success, this thesis could help shape policy frameworks for various value chains. Future studies can fill these gaps and give policymakers sound, situation-specific recommendations for bolstering agricultural cooperatives as catalysts for just development.

7.4. Contribution to Knowledge

This section formally states the contributions this thesis makes to scientific knowledge, in direct response to the research gaps articulated in Section 3.1. Five contributions are advanced. While the first contribution is empirical, the remaining four are theoretical and methodological.

First and foremost, the thesis offers insight from two countries and a combination of empirical examination of both observable (farm, household and social capital factors) and unobservable (psychological factors) determinants of cashew cooperative membership intentions in SSA. Prior studies in the field tend to investigate these three dimensions in isolation which produces incomplete evidence base. By integrating probit regression, structural equation modelling, and chi-square analysis across two strategically selected case studies, the thesis provides a more holistic empirical account than has been available in the African cooperative formation literature.

Secondly, the thesis validates and extends the TPB, augmented with the domain-specific knowledge and moral norms, as a robust explanatory framework for collective action intentions in export-oriented African agricultural settings. An important novelty in the thesis is the documentation of a clear cross-national divergence in the operation of the knowledge construct. In Kenya, the knowledge construct emerged as a dominant direct predictor of intention, which accounted for approximately 40 per cent of the explained variance in the endogenous intention construct. In Nigeria, however, the knowledge construct operated primarily as an indirect predictor, exerting its influence through attitudes and subjective norms. This divergence is not recoverable from the original three-construct TPB model, and it has not previously been documented in the African cooperative literature.

Thirdly, and probably the most interesting theoretical contribution of this thesis, the work advances a context-conditional refinement of social capital theory. The marginal effect of bridging social capital on membership intention is almost the same across the two case studies (0.187 in Kenya and 0.176 in Nigeria), yet the pathway through which this effect operates differs. In Kenya, the formality of the delivery channel carries the explanatory weight, with formal channels having a 12.0 percentage-point advantage in intention. In Nigeria, the effect of this channel is statistically insignificant. The weight of explanatory power shifts instead to the credibility of the human source. This finding extends what is already documented in the literature into the specific context of agricultural cooperative information flows in African export value chains. It also shows that the mechanism by which bridging ties translate information into collective action is endogenous to the institutional trust environment in which those ties are embedded.

Fourth, the thesis reveals the explanatory complementarity of both RUT and the extended TPB model in a single research design. While the RUT identifies the structural and economic conditions that determine the realistic options available to a smallholder farmer, the extended TPB explains the cognitive and normative factors that shape selection from the available options. When considered together, these two frameworks accommodate residual variance in cooperative membership intention that neither of these frameworks captures in isolation. This finding provides empirical support to the long-standing methodological position that both economic and socio-psychological theories of agricultural decision-making are complementary rather than mutually exclusive, and it constitutes one of the few empirical demonstrations of that complementarity in a SSA cooperative formation context.

Lastly, the final contribution concerns the study's engagement with gender and agricultural information access. Our findings revealed that gender does not significantly predict the source of information or the delivery channel in both case studies, adding a context-specific data point to the literature that has largely documented pronounced gender-based disparities in agricultural communication. Importantly, the study advances this finding not as evidence of equity but as a methodological and theoretical provocation. It shows that equal numbers on paper do not tell the full story. The reasons why women and men use the same sources and channels are often very different, and those differences, including financial constraints, shared knowledge gaps among women, and literacy barriers, are invisible to a chi-square test. By making these underlying patterns visible and linking them to household financial dynamics that literature on agricultural information has not systematically theorised or covered, the study contributes a more granular understanding of what gender-neutral quantitative results can and cannot mean in smallholder agricultural contexts.

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8. List of Author's Scientific Contributions

List of Scientific Publications

1. **Iyioku G**, Donkor E, Mazancova J. & Hejkrlik J. (2024). Understanding farmers' motivations for joining cashew marketing cooperatives in coastal Kenya: the moderating role of social capital. *Cogent Food & Agriculture*, 10(1). <https://doi.org/10.1080/23311932.2024.2433600>
2. **Iyioku G**, Donkor E, Nkomoki W, Mazancova J. & Hejkrlik J. (2025). Beyond Access: Evaluating the Impact and Counterfactual Outcomes of Input Subsidy Programmes on Smallholder Maize Farmers' Yield and Income in Zambia. *New Medit* 5 (2025). <https://doi.org/10.30682/nm2505i>
3. Adu-Boahen B, Donkor E, **Iyioku G**. & Mazancova J (2025). The Effect of Agricultural Cooperative Membership on Women's Empowerment: A Case of Rural Ashanti, Ghana. *Cogent Food & Agriculture*, 11(1). <https://doi.org/10.1080/23311932.2025.2538628>
4. *[Submitted manuscript]* **Iyioku G**, Donkor E, Hejkrlik J, Amoran I. & Mazancova J. (2025). Examining Cashew Farmers' Intentions to Join Cooperatives in Nigeria: A Behavioural Approach.

Conference Contributions

1. **Iyioku G**, Mazancová J, Hejkrlik J. 2021. Effect of Farmer Input Support Program on the Economic Performance of Smallholder Maize Farmers: A Case Study of Agricultural Cooperatives in Zambia. ELLS Scientific Student Conference 2021, Warsaw, Poland.
2. **Iyioku G**, Mazancová J, Hejkrlik J. 2024. What Affects Farmers' Intentions to Join Marketing Groups in Coastal Kenya? An Application of the Theory of Planned Behaviour (TPB). ICA CCR Europe Research Conference 2024, Dundee, UK.
3. **Iyioku G**, Mazancová J, Hejkrlik J. 2024. Modelling Farmers' Perception and Intention to Join Cashew Marketing Cooperatives: An Expanded Version of the Theory of Planned Behaviour. 14th CASEE Conference, Cluj-Napoca, Romania.
4. **Iyioku G**, Mazancová J, Hejkrlik J. 2025. Farmer's Perception and Intention to Join Cashew Marketing Cooperatives in Nigeria. 99th Annual Conference of the Agricultural Economics Society 2025, Bordeaux, France.

Project Participation

1. Participation in Food Systems Optimisation for Integrated Sustainable Ecosystems (FOODWISE) proposal development: EU-African Union – towards climate-neutral, social just fair trade food systems
Programme: Horizon Europe (HORIZON)
Call: Fair, healthy and environmentally-friendly food systems from primary production to consumption (HORIZON-CL6-2024-FARM2FORK-01)
Registration number: HORIZON-CL6-2024-FARM2FORK-01-11
Duration: 17 October 2023 - 22 February 2024
Link: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl6-2024-farm2fork-01-11>
2. Enhancement of Livelihoods in the Kenyan Coastal Region by Supporting Organic and Fair Trade Certification of Smallholders (EUTF05-HoA-KE-18/04) – Visegrad Four (V4) project in Kenya (2017 - 2022) - funded by The European Union Emergency Trust Fund for stability
Duration of Research Activity: 18th July 2021 - 24th August 2021
Exact Duration: 11th September 2017 till 10th September 2021 (Original start and end date). Project terminated in May 2022.
Registration number: T05-EUTF-HOA-KE-18-04
Link: [Faculty of Tropical AgriScience](#)

Award

Best Poster Presentation - Issued by Euroleague for Life Sciences (ELLS)
Online Scientific Student Conference, 2021. November 2021

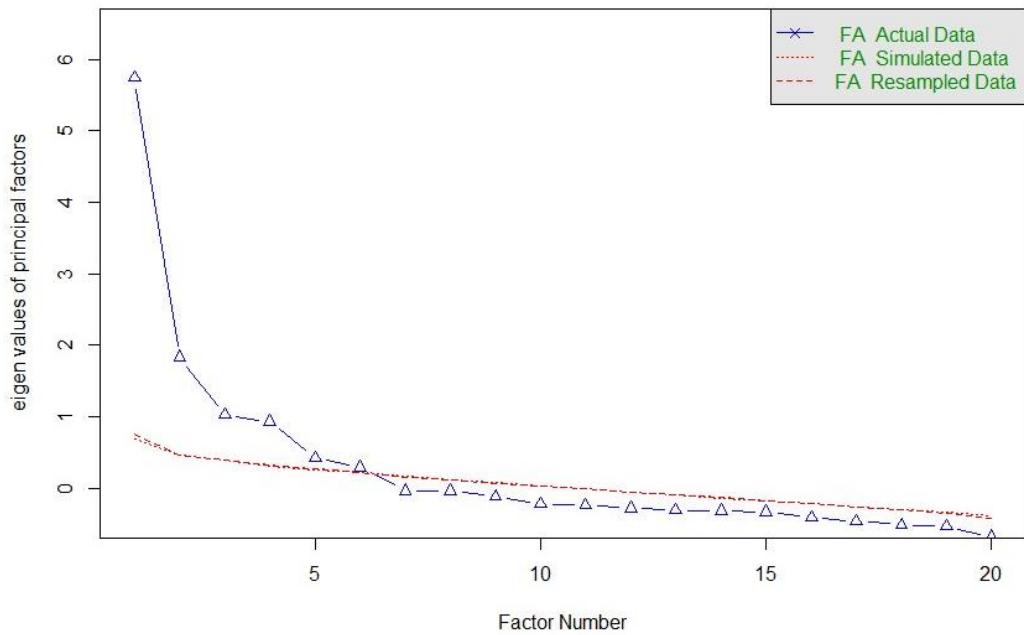
9. Appendices

Appendix A. Normality Test (Kenya)

Multivariate and Univariate Normality Test

Multivariate Normality				
Test	HZ	P value	MVN	
Henze-Zirkler	1.087	0.000	NO	
Univariate Normality				
Test	Variable	Statistic	P value	Normality
Anderson-Darling	ATT_1	14.740	<0.001	NO
Anderson-Darling	ATT_2	19.459	<0.001	NO
Anderson-Darling	ATT_3	12.410	<0.001	NO
Anderson-Darling	ATT_4	12.163	<0.001	NO
Anderson-Darling	INT_1	15.238	<0.001	NO
Anderson-Darling	INT_2	14.562	<0.001	NO
Anderson-Darling	INT_3	13.024	<0.001	NO
Anderson-Darling	KNOWLEDGE_1	15.058	<0.001	NO
Anderson-Darling	KNOWLEDGE_2	15.280	<0.001	NO
Anderson-Darling	MORAL_NORM_1	12.395	<0.001	NO
Anderson-Darling	MORAL_NORM_2	16.050	<0.001	NO
Anderson-Darling	MORAL_NORM_3	12.185	<0.001	NO
Anderson-Darling	MORAL_NORM_4	12.256	<0.001	NO
Anderson-Darling	PBC_1	24.543	<0.001	NO
Anderson-Darling	PBC_2	23.422	<0.001	NO
Anderson-Darling	PBC_3	17.802	<0.001	NO
Anderson-Darling	PBC_4	17.533	<0.001	NO
Anderson-Darling	SUB_NORM_1	17.053	<0.001	NO
Anderson-Darling	SUB_NORM_2	20.036	<0.001	NO
Anderson-Darling	SUB_NORM_3	13.198	<0.001	NO

Appendix B. Exploratory Factor Analysis of 20 Measurement Items (Kenya)



The parallel analysis scree plot validates the identification of six distinct factors.

Appendix C. Fornell-Larcker Analysis (Kenya)

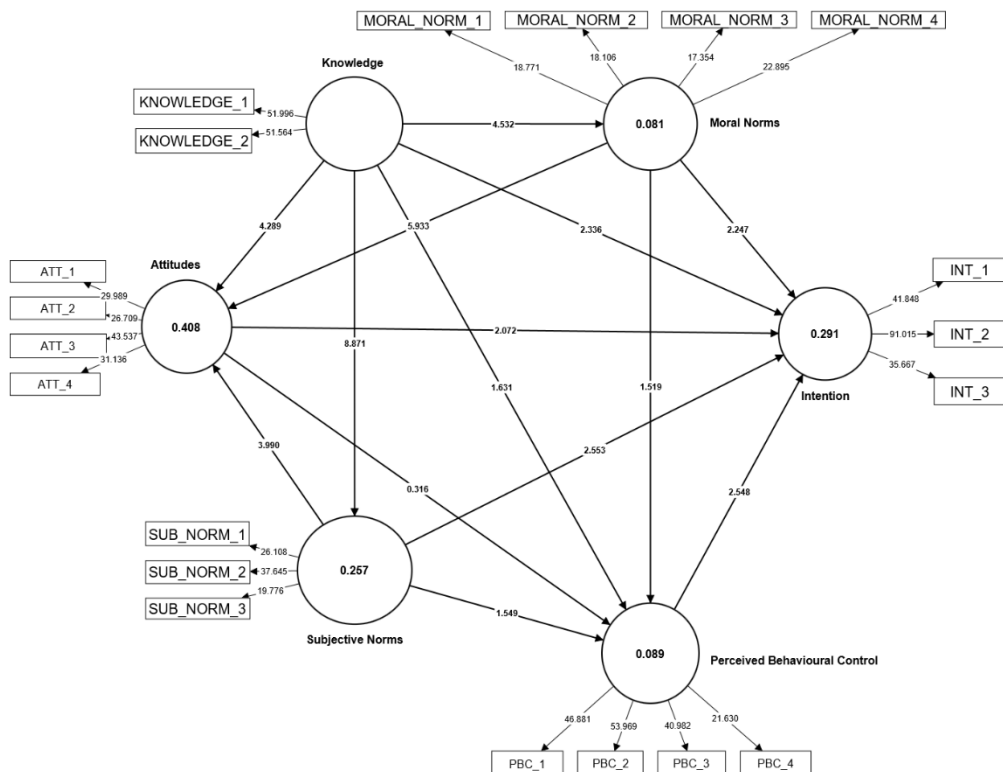
Constructs	Attitudes	Intention	Knowledge	Moral Norms	PBC	Subjective Norms
Attitudes	0.820					
Intention	0.414	0.912				
Knowledge	0.493	0.399	0.900			
Moral Norms	0.480	0.352	0.285	0.750		
PBC	0.206	0.285	0.238	0.206	0.878	
Subjective Norms	0.477	0.408	0.507	0.300	0.234	0.813

Appendix D. Heterotrait-monotrait ratio (HTMT) (Kenya)

Heterotrait-monotrait Ratio Divergent Validity Analysis

Constructs	Attitudes	Intention	Knowledge	Moral Norms	PBC	Subjective Norms
Attitudes	1.000					
Intention	0.471	1.000				
Knowledge	0.613	0.473	1.000			
Moral Norms	0.593	0.418	0.360	1.000		
PBC	0.230	0.308	0.285	0.238	1.000	
Subjective Norms	0.605	0.493	0.673	0.389	0.284	1.000

Appendix E. PLS-SEM Estimation Results for Robustness Check (Kenya)

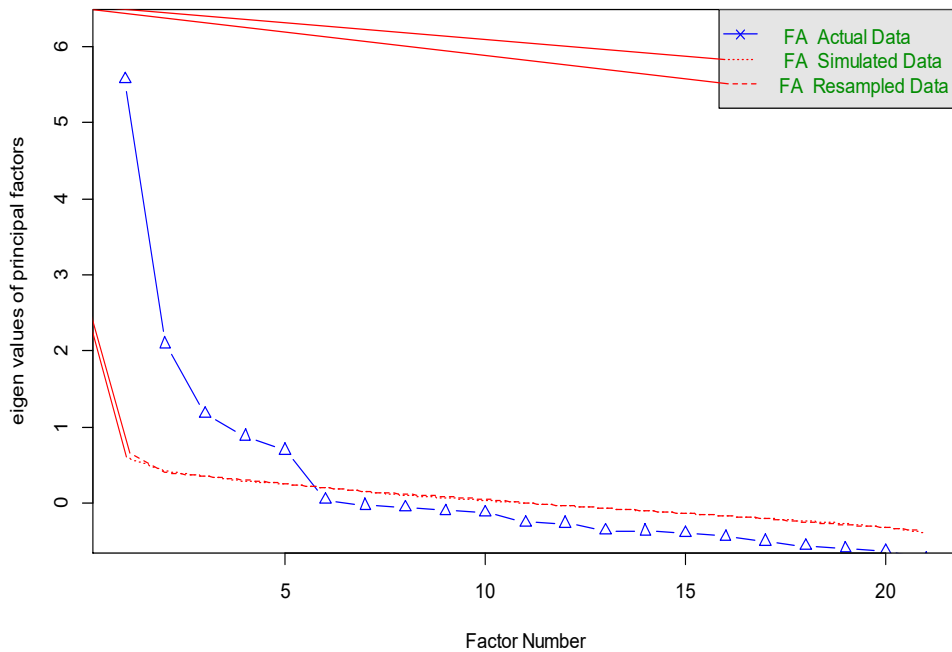


Appendix F - Multivariate and Univariate Analysis (Nigeria)

Multivariate Normality					
Test	HZ	P-value	MVN		
Henze-Zirkler	1.424	0.00	NO		
Univariate Normality					
No.	Test	Variable	Statistic	p-value	Normality
1	Anderson-Darling	ATT_1	18.4255	<0.001	NO
2	Anderson-Darling	ATT_2	19.4143	<0.001	NO
3	Anderson-Darling	ATT_3	15.5469	<0.001	NO
4	Anderson-Darling	ATT_4	23.3943	<0.001	NO
5	Anderson-Darling	ATT_5	16.3422	<0.001	NO
6	Anderson-Darling	SUB_NORM_1	16.2577	<0.001	NO
7	Anderson-Darling	SUB_NORM_2	20.5808	<0.001	NO
8	Anderson-Darling	SUB_NORM_3	14.0191	<0.001	NO
9	Anderson-Darling	SUB_NORM_4	16.553	<0.001	NO
10	Anderson-Darling	SUB_NORM_5	15.5972	<0.001	NO
11	Anderson-Darling	INT_1	16.6478	<0.001	NO
12	Anderson-Darling	INT_2	16.0748	<0.001	NO
13	Anderson-Darling	INT_3	16.5094	<0.001	NO
14	Anderson-Darling	PBC_1	13.3411	<0.001	NO
15	Anderson-Darling	PBC_2	13.3731	<0.001	NO
16	Anderson-Darling	PBC_3	15.0788	<0.001	NO
17	Anderson-Darling	KNOWLEDGE_1	32.4424	<0.001	NO
18	Anderson-Darling	KNOWLEDGE_2	32.6641	<0.001	NO
19	Anderson-Darling	KNOWLEDGE_3	25.3334	<0.001	NO

20	Anderson-Darling	KNOWLEDGE_4	23.9128	<0.001	NO
21	Anderson-Darling	KNOWLEDGE_5	18.8500	<0.001	NO

Appendix G – Exploratory Factor Analysis of 21 Measurement Items (Nigeria)



The parallel analysis scree plot validates the identification of five distinct factors.

Appendix H – Fornell-Larcker Analysis (Nigeria)

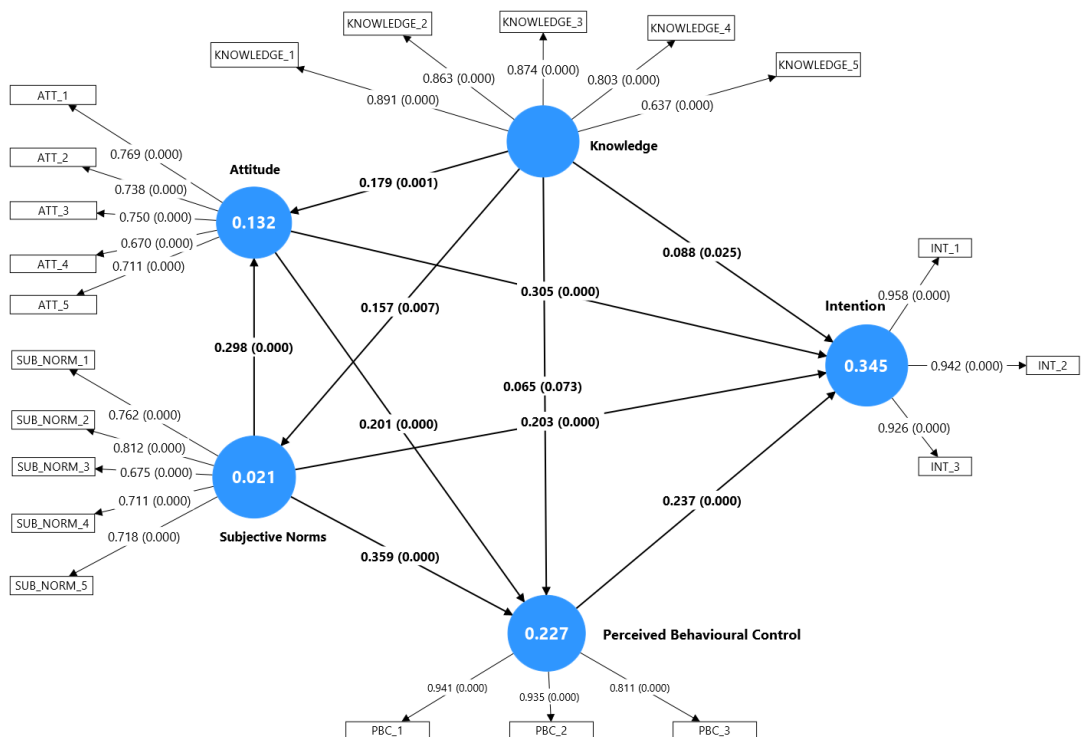
Constructs	Attitude	Intention	Knowledge	PBC	Subjective Norms
Attitude	0.729				
Intention	0.470	0.942			
Knowledge	0.226	0.228	0.819		
PBC	0.333	0.441	0.166	0.898	
Subjective Norms	0.326	0.419	0.157	0.435	0.737

Appendix I - Heterotrait-monotrait ratio (HTMT) (Nigeria)

Heterotrait-monotrait Ratio Divergent Validity Analysis

Constructs	Attitude	Intention	Knowledge	PBC	Subjective Norms
Attitude					
Intention	0.548				
Knowledge	0.272	0.248			
PBC	0.400	0.484	0.187		
Subjective Norms	0.404	0.472	0.173	0.513	

Appendix J. PLS-SEM Estimation Results for Robustness Check (Nigeria)

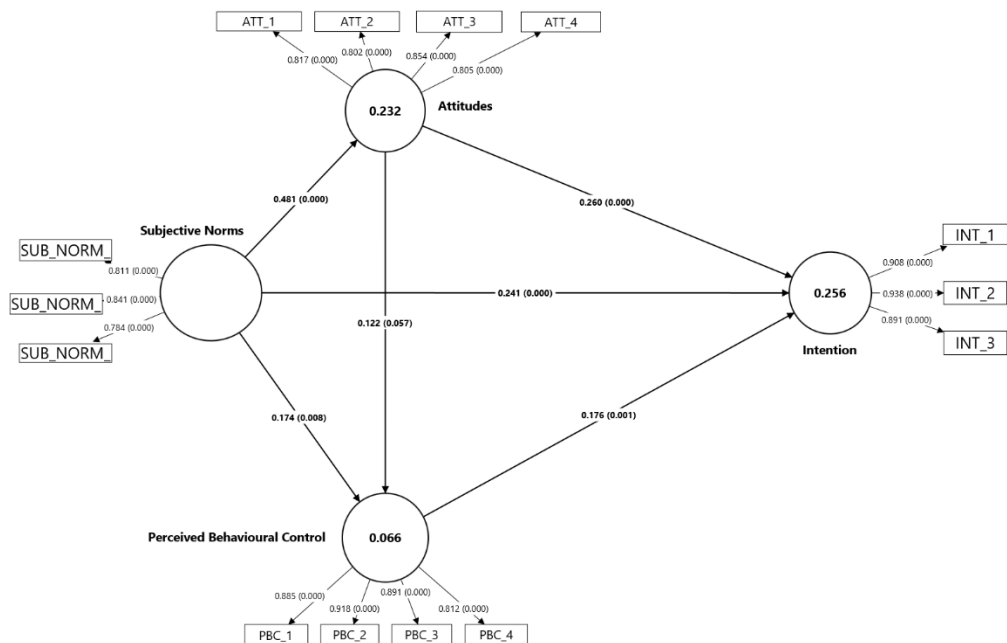


Values in parentheses are p-values.

Appendix H – Correlation Matrix (Nigeria)

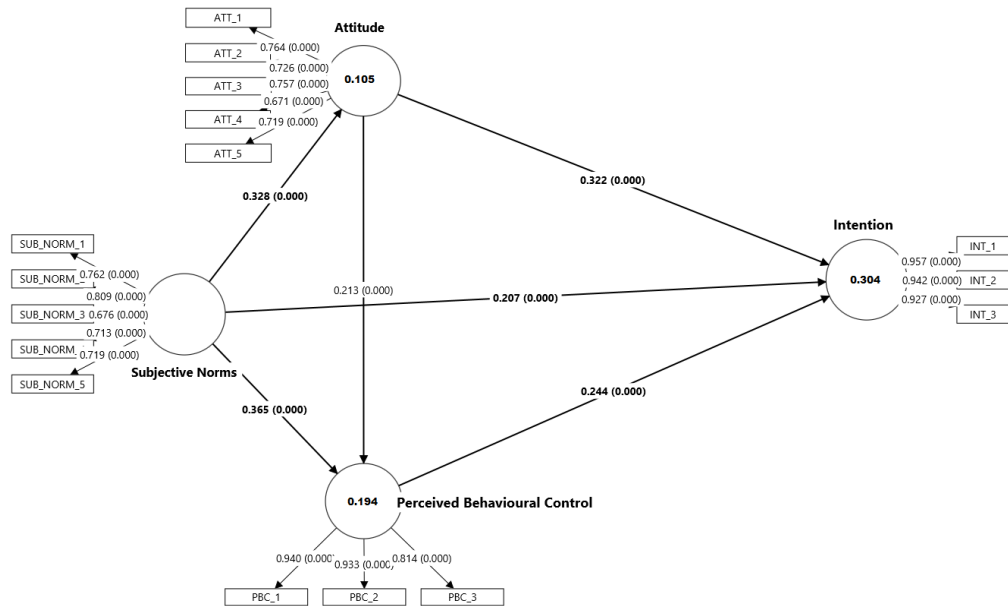
ATT_1	1.00	0.62	0.42	0.40	0.37	0.11	0.16	0.17	0.17	0.21	0.32	0.31	0.31	0.21	0.21	0.16	0.16	0.16	0.16	0.17	1	
ATT_2	0.62	1.00	0.44	0.34	0.29	0.11	0.17	0.12	0.17	0.17	0.31	0.32	0.29	0.24	0.23	0.16	0.23	0.21	0.23	0.22	0.25	0.8
ATT_3	0.42	0.44	1.00	0.38	0.46	0.16	0.16	0.08	0.32	0.22	0.35	0.36	0.35	0.16	0.22	0.16	0.10	0.11	0.16	0.09	0.00	0.6
ATT_4	0.40	0.34	0.38	1.00	0.39	0.04	0.17	0.12	0.16	0.12	0.32	0.26	0.28	0.16	0.22	0.20	0.11	0.16	0.15	0.13	0.08	0.4
ATT_5	0.37	0.29	0.46	0.39	1.00	0.17	0.25	0.16	0.27	0.21	0.35	0.34	0.34	0.27	0.28	0.24	0.13	0.12	0.16	0.08	0.04	0.6
SUB_NORM_1	0.11	0.11	0.19	0.04	0.17	1.00	0.50	0.43	0.49	0.43	0.29	0.24	0.27	0.33	0.28	0.25	0.10	0.16	0.16	0.04	0.05	0.4
SUB_NORM_2	0.19	0.17	0.16	0.17	0.25	0.50	1.00	0.47	0.43	0.49	0.41	0.40	0.37	0.33	0.32	0.29	0.10	0.16	0.28	0.10	0.08	0.2
SUB_NORM_3	0.17	0.12	0.08	0.15	0.16	0.43	0.47	1.00	0.43	0.32	0.22	0.20	0.19	0.23	0.20	0.20	0.01	0.04	0.14	-0.01	0.05	0
SUB_NORM_4	0.17	0.17	0.32	0.18	0.27	0.49	0.43	0.43	1.00	0.32	0.26	0.24	0.22	0.32	0.28	0.20	0.08	0.11	0.09	0.00	0.06	0.2
SUB_NORM_5	0.21	0.17	0.22	0.12	0.21	0.43	0.49	0.32	0.32	1.00	0.33	0.31	0.28	0.33	0.34	0.33	0.11	0.05	0.14	0.06	0.09	0
INT_1	0.32	0.31	0.35	0.32	0.35	0.29	0.41	0.22	0.26	0.33	1.00	0.87	0.83	0.41	0.41	0.31	0.23	0.22	0.22	0.16	0.12	-0.2
INT_2	0.31	0.32	0.36	0.26	0.34	0.24	0.40	0.20	0.24	0.31	0.87	1.00	0.79	0.38	0.41	0.28	0.16	0.16	0.20	0.15	0.12	0
INT_3	0.31	0.29	0.35	0.28	0.34	0.27	0.37	0.19	0.22	0.28	0.83	0.79	1.00	0.39	0.40	0.34	0.16	0.16	0.20	0.15	0.10	-0.2
PBC_1	0.21	0.24	0.18	0.19	0.27	0.33	0.33	0.23	0.32	0.33	0.41	0.38	0.39	1.00	0.87	0.63	0.10	0.16	0.17	0.08	0.15	-0.4
PBC_2	0.21	0.23	0.22	0.22	0.28	0.32	0.20	0.28	0.34	0.41	0.41	0.40	0.87	1.00	0.61	0.10	0.16	0.17	0.10	0.14	0.15	-0.6
PBC_3	0.20	0.16	0.19	0.20	0.24	0.25	0.29	0.21	0.20	0.33	0.31	0.28	0.34	0.63	0.61	1.00	0.08	0.08	0.07	-0.03	0.15	-0.8
KNOWLEDGE_1	0.16	0.23	0.10	0.11	0.10	0.10	0.10	0.01	0.05	0.11	0.23	0.18	0.16	0.15	0.15	0.05	1.00	0.78	0.73	0.67	0.40	-1
KNOWLEDGE_2	0.10	0.21	0.11	0.10	0.10	0.16	0.18	0.04	0.11	0.05	0.22	0.18	0.16	0.19	0.18	0.05	0.78	1.00	0.68	0.59	0.43	-1
KNOWLEDGE_3	0.16	0.23	0.10	0.15	0.16	0.10	0.20	0.14	0.09	0.14	0.22	0.20	0.20	0.17	0.17	0.07	0.73	0.68	1.00	0.63	0.43	-1
KNOWLEDGE_4	0.10	0.22	0.09	0.10	0.08	0.04	0.10	0.01	0.00	0.06	0.18	0.15	0.15	0.09	0.10	-0.00	0.67	0.59	0.63	1.00	0.48	-1
KNOWLEDGE_5	0.17	0.25	-0.01	0.08	0.09	0.08	0.08	0.00	0.00	0.09	0.10	0.10	0.10	0.15	0.14	0.15	0.40	0.43	0.43	0.48	1.00	-1
	ATT_1	ATT_3	ATT_5	SUB_NORM_3	INT_1	INT_3	PBC_2	KNOWLEDGE_3														

Appendix I – Core TPB Model (Kenya)



Values in parentheses are p-values.

Appendix J – Core TPB Model (Nigeria)



Values in parentheses are p-values.

Academic CV - Gospel Ayodele IYIOKU

Prague, Czech Republic | [LinkedIn](#) | +420 773 506 898 | g.iyioku@gmail.com

EDUCATION

Czech University of Life Sciences | Prague, Czech Republic

Ph.D. in Sustainable Rural Development (Specialization: Sustainable Technologies)

July 2021 - Present

Dissertation Topic: Communication and group dynamics of producer cooperatives in export-oriented value chains: A study of cashew farmers in Sub-Saharan Africa

M.Sc. in International Development & Agricultural Economics

Graduation date: July 2021

Grade: 1.41 / 3.00 (Where 1 is Excellent and 3 is Satisfactory)

Thesis Topic: Access to input subsidies through cooperatives: Does it improve the economic performance of farmers in the western province of Zambia?

Federal University of Agriculture Abeokuta | Ogun State, Nigeria

B.Sc. in Agricultural Economics & Farm Management

Graduation date: April 2018

Grade: 4.58 / 5.00 (First Class Honors)

Thesis Topic: Effect of Lift Above Poverty Organization (LAPO) on productivity of maize farmers in Oyo State, Nigeria.

RESEARCH INTERESTS

Agricultural Cooperatives & Value Chains | Sustainable Rural Livelihoods | Behavioural Economics of Smallholder Farmers | Impact Evaluation of Agricultural Policies | Social Capital and Farmer Organizations

SCIENTIFIC PUBLICATIONS

1. **Iyioku, G.**, Donkor, E., Mazancova, J., & Hejkrlik, J. (2024). Understanding farmers' motivations for joining cashew marketing cooperatives in coastal Kenya: the moderating role of social capital. *Cogent Food & Agriculture*, 10 (1). <https://doi.org/10.1080/23311932.2024.2433600>
2. **Iyioku, G.**, Donkor, E., Nkomoki, W., Mazancova, J., & Hejkrlik, J. (2025). Beyond Access: Evaluating the Impact and Counterfactual Outcomes of Input Subsidy Programmes on Smallholder Maize Farmers' Yield and Income in Zambia. *New Medit* 5 (2025). <https://doi.org/10.30682/nm2505i>
3. Adu-Boahen, B., Donkor, E., **Iyioku, G.**, & Mazancova, J. (2025). The Effect of Agricultural Cooperative Membership on Women's Empowerment: A Case of Rural Ashanti, Ghana. *Cogent Food & Agriculture*, 11 (1). <https://doi.org/10.1080/23311932.2025.2538628>
4. **Iyioku, G.**, Donkor, E., Hejkrlik, J., Amoran, I., & Mazancova, J. (2025). Examining Cashew Farmers' Intentions to Join Cooperatives in Nigeria: A Behavioural Approach. (*Manuscript Submitted*)

CONFERENCE CONTRIBUTIONS

1. **Iyioku, G.**, Mazancová, J., Hejkrlik, J. (2024). Farmer's Perception and Intention to Join Cashew Marketing Cooperatives in Nigeria. 99th Annual Conference of the Agricultural Economics Society. Bordeaux, France.
2. **Iyioku, G.**, Mazancová, J., Hejkrlik, J. (2024). What Affects Farmers' Intentions to Join Marketing Groups in Coastal Kenya? An Application of the Theory of Planned Behaviour (TPB). ICA CCR Europe Research Conference. Dundee, UK.
3. **Iyioku, G.**, Mazancová, J., Hejkrlik, J. (2024). Modelling Farmers' Perception and Intention to Join Cashew Marketing Cooperatives: An Expanded Version of the Theory of Planned Behaviour. 14th CASEE Conference. Cluj-Napoca, Romania.

4. **Iyioku, G., Mazancová, J., Hejkrlik, J. (2021).** Effect of Farmer Input Support Program on the Economic Performance of Smallholder Maize Farmers: A Case Study of Agricultural Cooperatives in Zambia. ELLS Scientific Student Conference. Warsaw, Poland.

RESEARCH GRANTS & PROJECTS

1. Food Systems Optimisation for Integrated Sustainable Ecosystems (FOODWISE) | Participating Researcher

Horizon Europe (HORIZON-CL6-2024-FARM2FORK-01-11) | Oct 2023 - Feb 2024

Contributed to proposal development for an EU-African Union project aiming to create climate-neutral, fair-trade food systems.

2. Enhancement of Livelihoods in the Kenyan Coastal Region | Research Team Member
European Union Emergency Trust Fund (EUTF05-HoA-KE-18/04) | Jul 2021 - Aug 2021 (Fieldwork)

Conducted field research in Kenya supporting organic and fair-trade certification for smallholders as part of a Visegrad Four (V4) project.

AWARDS AND HONORS

Best Poster Presentation | Euroleague for Life Sciences (ELLS) Scientific Student Conference | 2021

WORK EXPERIENCE

McKinsey & Company | Prague, Czech Republic

Senior Analyst | IT Analytic Specialist

September 2021 – Present

- Developed and implemented comprehensive ESG strategy and reporting framework for 30+ business units, establishing standardized metrics and data collection processes that reduced reporting time by 40% while enhancing compliance with GRI and SASB standards.
- Led cross-functional sustainability initiatives, collaborating with engineering, product, and operations teams to integrate ESG considerations into business processes and decision-making frameworks.
- Conducted materiality assessments and stakeholder analysis to identify key sustainability priorities, developing strategic roadmaps that increased internal ESG program adoption by 27% within 12 months.
- Designed and implemented sustainability performance dashboards and monitoring systems, enabling real-time tracking of ESG KPIs and supporting data-driven strategy adjustments.
- Facilitated sustainability strategy workshops with senior leadership, translating complex sustainability requirements into actionable business strategies and operational plans.

METHODOLOGICAL AND TECHNICAL SKILLS

Research Methods: Impact Evaluation (RCTs, Propensity Score Matching), Structural Equation Modelling (SEM), Theory of Planned Behaviour, Survey Design, Field Experimentation

Quantitative Analysis: STATA, R, SmartPLS, Python, SPSS, MATLAB, Advanced Excel

Data Management & Visualization: Power BI, Tableau

Strategy & Frameworks: ESG Integration, Sustainability Transformation, Materiality Assessment, GRI & SASB Reporting, TCFD Implementation, SDG Alignment

Technical Expertise: Carbon Accounting, Sustainable Supply Chains, Renewable Energy Strategy, Stakeholder Engagement

Tools and Analytics: LCA Software, ESG Reporting Platforms, ETL Processes, Data Warehousing, Data Quality Assurance, Alteryx, KNIME, Tableau Prep, JIRA

Members Questionnaire (Template)

Interview date...../...../20... ..

Hello, my name is I work with TSC (*Interviewer give a brief description of the V4 Project*)

We would request you to please help us identify specific issues facing farmers in the area. We have randomly chosen you to represent farmers in this region by way of answering a few questions relating to the same. Please note that the information you give us is for OUR USE ONLY and will NEVER be used with any other institution.

SECTION A: DEMOGRAPHICS

Name of farmer	.....
Farmer mobile no	.....
County	.....
Village	.....
GPS location of farm	.....
Gender of farmer	Male b) Female
Age of farmer	.....
Religion of respondent (optional)	[a] Christianity [b] Islamic [c] Traditional [d] None [e] Others
Ethnicity (optional)	.....
Number of household members (optional)	.....
How long have you lived in your community? (years)	.....
Total size of farm (in acres)	.....
Acres of hired land (in acres)	.....
Is your main income from cashew?	Yes b. No
What other crops you use for income?	a) Maize b) Cassava c) Mango d) Coconut e) Oranges f) others
Who is the registered owner of the farm?	a) Husband b) Wife c) Shared myself& Spouse d) Parents of husband e) Parents of wife

	f) Children g) Hired Land h) No official registration (communal land) i) Other - Specify
Who is in charge of the farm?	a) Husband b) Wife c) Shared myself & Spouse d) Parents of husband e) Parents of wife f) Children
Who takes care of the cashew trees?	a) Husband b) Wife c) Shared myself & Spouse d) Parents of husband e) Parents of wife f) Children g) Hired labour h) Other - Specify
Highest level of education reached in the household	a) No formal education b) Primary education c) Secondary education d) Tertiary education
Marital status	[a] Single [b] Married [c] Widowed [d] Divorced [e] Separated
Are you the head of the household?	a) Yes b) No
If not, relation to the head of the household?	a) Husband b) Wife c) Parent d) Other specify

SECTION B: CASHEW NUT FARMING

	Total number of cashew trees on the farm (old and new trees together)	..... .....
	How many new cashew trees have you planted in the last 3 years?	..... .....
	How did you plant new trees?	As random intercropping without any plan As a new orchard with regular spacing
	How much did you pay for new cashew trees? (KHS per seedling)	..... .....
	How many old trees (older than 10 years) are bearing fruit?	..... .....
	Number of old trees that have been top-worked in the last 3 years	..... .....
	Number of trees that have been pruned/thinned in the last 3 years	..... .....
	The yield from my trees has increased in the last 3 years by:	a) Decreased b) No change c) 1-5 kg increase d) 5-10kg increase e) More than 10kg

PRODUCTION OF CASHEW IN LAST SEASON

	Total Kg harvested in this season	
	Total raw cashew sold in this season (Kg)	
	Selling price per 1 kg in this season (KES)	
	Satisfaction with the purchasing price for product	a) Strongly satisfied b) Satisfied c) Neither satisfied nor dissatisfied d) Dissatisfied e) Strongly dissatisfied
	If there are quantities damaged, what are the reasons for spoilt crop?	.....
	Share of selling to TCL (%)	
	Share of selling to brokers (%)	
	Share of selling to other companies (%)	
	Sale type	A written contract with TSL Non-contractual
	The volume specified in the written contract (kg)	
	Guaranteed selling minimum price (KHS)	
	Duration of contract (years)	
	Do you keep financial evidence for cashew?	No

		Yes
	How far is your nearest TCL purchasing centre? (km)	

SECTION C: FARM PRACTICES

	Is your farm Fairtrade Certified?	a) Fairtrade certified b) Audit underway c) Non-Certified
	Is your farm Organic Certified?	a) Organic Certified b) Conversion underway c) Non-certified
	How much organic fertilizer do you use on your farm for cashew per year (kg)?	
	How much chemical fertilizer do you use on your farm for cashew per year (kg)?	
	Do you hire anyone to work with cashew on the farm?	a) No, only use family labour b) Yes.
	How many employees do you employ to work on the farm with cashew? Number	
	Have you used the service of youth group to do the top-working of your cashew?	A) Yes B) No

OVERALL INCOME ASSESSMENT:

	On average, how much KES per year do you make by selling your cashew yield?	KES/year
	Total household farm income	KES/year
	Total household income, including non-farm income	KES/year

SECTION D: GROUP PARTICIPATION

	Are you part of a VSLA group?	a) Yes b) No
	Are you part of a producer group? (any product)	a) Yes b) No
	If yes, name the product of the group	.....
	Are you willing to join cashew marketing producer groups?	a) Yes b) No
	How many groups are you part of (VSLA, SACCO, producers group, women group...etc)	.....
	How often do you attend various groups meetings	a) Weekly b) Bi-weekly

		c) Monthly d) Quarterly e) Annually
	As a member, how active are you in participation in the group (speaking, members of the board, decision making, voting...)	a) Very active b) Rather active c) Unbiased d) Rather passive e) Very passive
	The groups where I participate are:	a) Very active b) Rather active c) Unbiased d) Rather passive e) Very passive
	If you are member of VSLA group how much you save per month (KES)	.....
	If you are member of VSLA group how much borrowed in the last year? (KES)	.....
Membership in associations		
	Are you part of any women association? (only for female respondents)	a) Yes b) No
	If yes, what is the purpose of the association	.....
FARMER PERCEPTIONS ON COMMUNITY (Social Capital)		
<i>Interviewer: for the following section read out the statement and let the farmer give their opinion to the statement. Circle the correct answer.</i>		
D1	Most neighbouring farmers are willing to help farmers if in need <i>Wakulima jirani wanajitolea kusaidia mkulima mwenza akihitaji usaidizi</i>	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
D2	Over the last 3 years, the level of trust and solidarity in the community has become better <i>Katika miaka mitano ambayo imepita uaminifu, uhusiano na umoja katika hii jamii umeimarika/ umeboreka</i>	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
D3	Neighbouring farmers can be trusted <i>Wakulima jirani wanaeza aminika</i>	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no

SECTION E: JOINING CASHEW COOPERATIVES

E1)	(ATTITUDE) I believe that joining a cashew cooperative is an effective way to get better prices for my produce through collective bargaining	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no
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		e) Absolutely no
E2)	(ATTITUDE) I believe that being a member of a cashew cooperative will expand my market access and create more selling opportunities	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E3)	(ATTITUDE) I think that joining a cooperative will provide access to market information, which will help me sell my cashews more profitably	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E4)	(ATTITUDE) I believe that being a part of a cashew cooperative will help me stabilise my income through collective sales and price negotiations	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E5)	(ATTITUDE) I believe that cooperative membership will improve my long-term earnings and provide financial security	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E6)	(INTENTIONS) I will join a cashew cooperative to gain access to training and knowledge-sharing opportunities	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E7)	(INTENTIONS) I will join a cashew cooperative to benefit from shared resources and collective bargaining power	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E8)	(INTENTIONS) I will join a cashew cooperative to become an active to strengthen my network with other farmers and gain better support	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E9)	(PERCEIVED BEHAVIOURAL CONTROL) I feel confident that I have the necessary resources (e.g., membership fee) to participate in a cashew cooperative	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E10)	(PERCEIVED BEHAVIOURAL CONTROL) Joining a cooperative is within my control, and I can commit my time and effort to it	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E11)	(PERCEIVED BEHAVIOURAL CONTROL) I am confident that I can contribute meaningfully to	a) Absolutely yes b) Rather yes

	cooperative activities, such as group farming or collective marketing	c) Unbiased d) Rather no e) Absolutely no
E12)	(SUBJECTIVES NORMS) My friends have a positive feeling towards cooperatives and encourage me to join a cooperative too	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E13)	(SUBJECTIVE NORMS) Some farmers in my community are part of a cooperative, and I feel I should join as well	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E14)	(SUBJECTIVE NORMS) My family believes that joining a cooperative is a good decision and supports me in becoming a member	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E15)	(SUBJECTIVE NORMS) I feel pressure from other farmers to join a cooperative because it is seen as a common practice in my area	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E16)	(SUBJECTIVE NORMS) Agricultural experts have encouraged me to join cooperatives, and I think I should become a member	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E17)	(KNOWLEDGE) I understand how cashew cooperatives operate and how they support their members	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E18)	(KNOWLEDGE) I am familiar with the leadership structure and decision-making processes within cooperatives	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E19)	(KNOWLEDGE) I have a clear understanding of the benefits that cooperative membership can provide, such as better prices and access to markets	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E20)	(KNOWLEDGE) I am aware of the marketing opportunities and collective bargaining advantages offered by cooperatives	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no

E21)	(KNOWLEDGE) I know the potential challenges and risks involved in joining a cashew cooperative	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E22)	(MORAL NORMS) I would feel guilty if I did not explore the option of cooperative membership.	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E23)	(MORAL NORMS) I believe that cooperating with other cashew farmers is both legally and morally acceptable.	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E24)	(MORAL NORMS) I feel a sense of duty to contribute to the growth of the local cashew industry through cooperative participation.	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
E25)	(MORAL NORMS) I would feel a sense of responsibility towards fellow cashew farmers by joining a cooperative.	a) Absolutely yes b) Rather yes c) Unbiased d) Rather no e) Absolutely no
Challenges and barriers: Evaluate the following obstacles. Evaluate each of the constraints by (1-5) – 1 Very agree, 2 – agree, 3- Not agree, not disagree, 4, disagree, very disagree		
E26)	The problem with my joining a cooperative is that I will have to spend time helping others	(1-2-3-4-5)
E27)	The problem with my joining a cooperative is that I will lose my autonomy to decide about my farm	(1-2-3-4-5)
E28)	The problem with my joining a cooperative is that I will lose my time because of cooperative meetings and duties	(1-2-3-4-5)
E29)	The problem with my joining a cooperative is that I will have to pay the membership fees	(1-2-3-4-5)
E30)	The problem with my joining a cooperative will be low trust in leaders	(1-2-3-4-5)
E31)	The problem with my joining a cooperative will be low trust in other members	(1-2-3-4-5)
E32)	The problem with my joining a cooperative will be the long walking distance from my house to the cooperative HQ	(1-2-3-4-5)
E33)	The problem with my joining a cooperative is a bad experience with the failures of cashew marketing cooperatives in the past	(1-2-3-4-5)
E34)	The problem with my joining a cooperative is that farmers who are not members of our cashew	(1-2-3-4-5)

	marketing cooperative will make more sales/money than farmers who are members of the cooperative	
E35)	The problem with my joining a cashew cooperative is the possibility of bankruptcy or stealing of the cooperative money by somebody else	(1-2-3-4-5)

SECTION F: NETWORKING

F1	How many community members, including relatives, can you rely on for help in critical times? (NUMBER)	.....
F2	Do you have friends or relatives in leadership positions?	[a] Yes [b] No
F3	Please indicate who you go to for agricultural help or advice. Choose the one who is the most important.	[a] Family members [b] Friends [c] Private extension worker [d] Public extension worker [e] Neighboring farmers [f] Relative farmers [g] Input dealers [h] Cooperative officials/members [i] TSC experts/field officers [j] Others (Please specify)
F4	What type of relationship do you have with the person(s) listed in the question above?	[a] None [b] Formal [c] Informal
F5	How often do you seek advice from the person(s) listed in the question above?	Weekly [] Monthly [] Quarterly [] less than half a year []
F6	What is the primary (most used) way of communicating with the person(s) listed in the question above?	[a] Face-to-face [b] Telephone [c] Social media [d] Farmer events [e] Trainings [g] Others (e.g., radio programs, agricultural TV shows)
F7	How many people living in a larger town /e.x. Kilifi/ can you rely on? NUMBER	
F8	How many friends or relatives of another gender can you rely on? NUMBER	

SECTION D: ACCESS TO EXTENSION SERVICES & TRAINING

G1)	Have you received in last 3 years any extension support for your cashew?	a) Yes b) No
G2)	If yes, from whom have you received extension support?	a) Gvt extension officers b) Other farmers

		c) TSC d) Other private firms e) Others
G3)	Frequency of visits by TSC extension service provider	a) Once a month or more b) Quarterly c) Once every 6 months d) Once a year e) Infrequent: Only when needed
G4)	Quality of provided TSC visits	a) Very good b) Rather satisfactory c) Unbiased d) Rather low e) Very poor
G5)	Have you received any TSC organized training on your cashew nut production in the last 3 years?	a) Yes b) No
G6)	Quality of TSC organized training	a) Very good b) Rather satisfactory c) Unbiased d) Rather low e) Very poor