PARTICIPATION AND MOTIVATION OF AQUACULTURE FARMERS IN FARMER-TO-FARMER KNOWLEDGE TRANSFER IN EDO SOUTH ZONE, EDO STATE, NIGERIA

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A PROJECT SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES, FACULTY OF AGRICULTURE, UNIVERSITY OF BENIN, BENIN CITY, IN PARTIAL FUFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELOR OF AGRICULTURE (B. AGRIC) (WITH OPTION OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES)

NOVEMBER, 2025

CERTIFICATION

This is to certify that this research work on Participation and motivation of aquaculture farmers in farmer-to-farmer knowledge transfer in Edo South Zone, Edo state, Nigeria was carried out by **Vanessa Osaretin OMO-OSAGIE (Miss)** with Matriculation Number **AGR2000039** under the supervision of the department of Agricultural Economics and Extension Services, Faculty of Agriculture, University of Benin, Benin City, Edo State, Nigeria

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DEDICATION

This research work is dedicated to the Almighty God, the source of all knowledge, strength, and understanding. His infinite grace and constant provision have been the foundation and guiding light throughout every challenge of this academic pursuit.

I also dedicate this work to the loving memory of my dear late father. His life was a testament to sacrifice, hard work, and the profound value of education. Though he is absent in person, his unwavering encouragement, enduring belief in my potential, and the principles he instilled continue to drive me forward. This achievement is a realization of the dream we shared, and his memory is the bedrock of my resilience.

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ABSTRACT

Aquaculture has become a critical element of the world's food security chain and provides a sustainable approach to protein security, poverty alleviation, and diversification of living resources. This study was conducted to assess participation and motives in the farmer-to-farmer knowledge transfer program for aquaculture farmers of the Edo South Agricultural Zone. The specific aims of the research were to: describe the socio-economic characteristics of aquaculture farmers in the study area; ascertain the level of participation of aquaculture farmers in farmer-to-farmer knowledge transfer initiatives in the study area; determine the motivations of aquaculture farmers in farmer-to-farmer knowledge transfer in the study area; and determine the constraints faced by aquaculture farmers in participating in farmer-to-farmer knowledge transfer in the study area.

The multistage sampling technique was used to obtain a sample of 120 aquaculture farmers from three cluster communities from Ikpoba- Okha LGA. Data were collected using structured questionnaire. Data were analysed using descriptive and inferential statistics tools such as frequency count, percentages, mean and standards deviation. Hypotheses were tested using Pearson correlation at 0.05 level of significance.

Results showed farmers mostly of males (52%), with a mean age of 43, with (97%) attaining at least secondary education. The majority (62%) ranked aquaculture as their primary occupation. The level of farmer participation within the knowledge-transfer program remains high, with a mean score of 3.33 to 4.24, representing high levels of farmer participation, notably during pond construction (100%), feeding (94.9%), drug administration (100%), and harvest (99.2%). However, participation is low concerning feed formulation (14.4%), pond fertilization (16.1%), and marketing (39.0%). The absence of formal training programs related to knowledge sharing (mean of 3.75), the absence of organized learning platforms (mean of 3.50), and the lack of trust within the knowledge shared (mean of 3.02) were the major constraints. The results also showed that households size (–0.250; $p = 0.006$) was significant. While the level of motivation possessed a significant positive relationship (correlation coefficient of $r = 0.427$, a significance level of $p = 0.000$). it was concluded that knowledge-transfer program among farmers is important within the promotion of aquaculture innovation and alleviates the low formal extension framework within Edo State. It was recommended that the level of participation within the knowledge-transfer program represents a positive

and inclusive towards addressing the growth of aquaculture within the small-scale systems of the Nigerian farmer.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

According to Robert Stickney, (2022), aquaculture is the rearing of aquatic organisms under controlled or semi controlled conditions. Aquaculture, the farming of aquatic organisms, has emerged as a critical sector for ensuring food security, generating income, and alleviating poverty, particularly in developing nations (FAO, 2022). As global populations continue to rise and wild fish stocks face increasing pressure, aquaculture offers a sustainable alternative to meet the growing demand for aquatic protein. In Nigeria, the potential for aquaculture development is substantial, owing to its vast water resources and favorable climatic conditions (Adeyemo & Olaniyan, 2018). However, the full realization of this potential is often hampered by various challenges, including limited access to appropriate technologies, inadequate technical skills, and insufficient knowledge dissemination among smallholder farmers (Brummett & Williams, 2017).

The global demand for fish and fishery products has been steadily increasing, driven by population growth, rising incomes, and a growing recognition of fish as a healthy protein source (FAO, 2022). Aquaculture serves as the fastest-growing food-producing sector globally, the farming of aquatic organisms, offers significant potential for enhancing food security, creating employment opportunities, and fostering economic growth, particularly in developing countries (Subasinghe *et al*., 2009).

Aquaculture provides high-quality proteins (accounting for 15% of animal proteins and 6% of total proteins worldwide) and essential micronutrients like omega-3 fatty acids, minerals, and vitamins (FAO, 2024). Global per capita annual consumption of aquatic foods rose from 9.1 kg in 1961 to 20.7 kg in 2022, highlighting their growing importance in diets (FAO, 2024).

Consequently, there has been a growing recognition of the efficacy of farmer-to-farmer knowledge transfer as a complementary, and at times more effective, mechanism for diffusing agricultural innovations and best practices (Pretty & Smith, 2004). Farmer-to-farmer knowledge transfer weighs on the existing social networks and trust among farmers, allowing for the mutual exchange of practical experiences, indigenous knowledge, and innovative techniques that are often directly applicable to local contexts (Van den Ban & Hawkins, 1996). This approach is particularly relevant in aquaculture, where hands-on experience and tacit knowledge are crucial for successful operations.

Despite the acknowledged benefits of farmer-to-farmer knowledge transfer, the dynamics of farmer participation and the underlying motivations that drive knowledge sharing and adoption within these networks remain unemphasized, particularly within the context of aquaculture in specific geographical zones. While literature often highlights the general advantages of peer learning, a nuanced understanding of why some farmers actively participate in knowledge transfer while others do not, and what motivates them to share

and adopt new practices, is crucial for designing effective and sustainable extension strategies.

Therefore, this study aims to investigate the factors influencing participation and motivation in farmer-to-farmer aquaculture knowledge transfer within the Edo South Zone. By examining the drivers of engagement and the incentives for sharing and adopting knowledge, this research seeks to provide valuable insights that can inform the development of more effective and sustainable aquaculture extension programs in the region and beyond.

Understanding the intricate interplay of social, economic, and individual factors that shape farmer to farmer knowledge transfer will contribute to maximizing the impact of peer learning initiatives, ultimately fostering improved productivity, profitability, and sustainability within the smallholder aquaculture sector.

1.2 Problem Statement

According to NOBA AFRICA, despite the significant potential of aquaculture to contribute to food security, poverty alleviation, and economic diversification in Nigeria, its full realization is hampered by persistent challenges, particularly at the small-scale farmer level. Nigeria continues to face a substantial fish supply deficit, necessitating considerable imports that drain valuable foreign exchange. For instance, the Central Bank of Nigeria (CBN) has consistently highlighted an annual fish supply-demand gap of approximately 2.5 million metric tons, necessitating significant imports (CBN, n.d.).

Recent economic reports indicate that Nigeria spent N50.78 billion importing fish in the third quarter of 2023 alone (BusinessDay NG, 2024). This ongoing demand-supply imbalance underscores the urgent need for accelerated growth and improved efficiency within the domestic aquaculture industry. A considerable portion of Nigeria's fish production originates from small-scale farmers who frequently operate with limited resources, outdated technologies, and inadequate access to crucial information and skills, leading to technical inefficiencies in their production systems (Olagunju *et al*., 2013).

Conventional agricultural extension services, traditionally tasked with bridging this knowledge gap, have often proven inadequate in effectively reaching and equipping all small-scale farmers in Nigeria (Josephine, 2020; Business Day). These services frequently contend with severe limitations such as chronic underfunding, a scarcity of adequately trained personnel, disproportionately high farmer-to-extension worker ratios, and logistical barriers that impede access to remote rural communities (Agbamu, 2000; World Bank, 2007). As a direct consequence of these systemic weaknesses, many fish farmers, continue to rely on traditional, less efficient methods. They often lack access to contemporary technical know-how on essential aquaculture practices such as optimal pond management, cost-effective feed formulation, effective disease control, and improved breeding techniques (Ibe & Alaku, 2014; Edo State Ministry of Agriculture and Food Security, 2020). This deficiency in knowledge and practice translates into lower productivity, increased operational costs, and ultimately, reduced profitability, thereby causing difficult opportunities for significant livelihood improvement.

Farmer-to-farmer knowledge transfer has been long recognized as a promising alternative for disseminating agricultural information (Evelyne, 2015), a lot of such studies has been conducted in many African countries like Kenya, Nigeria, Ghana. However, its efficacy within the aquaculture sector remains inadequately explored in Nigeria, Edo state particularly. This presents a gap in systematically understanding what specific factors drive or impede the participation and motivation of farmers in sharing knowledge with one another.

Are farmers willing to commit their valuable time, limited resources, and hard-earned experiences to share with their peers, and what exact influences modulate this willingness?

1.3 Research Questions

This study seeks to answer the following research questions which are;

i. What are the socio-economic characteristics of aquaculture farmers in the Edo South Zone?

ii. What is the level of participation of aquaculture farmers in farmer-to-farmer knowledge transfer in the Edo South Zone?

iii. What are the motivations that influence aquaculture farmers' participation in farmer-to-farmer knowledge transfer in the Edo South Zone?

iv. What are the constraints faced by aquaculture farmers in participating in farmer-to-farmer knowledge transfer in the Edo South Zone?

1.4 Objectives of the study

The general objective of this study is to examine the participation and motivation in farmer-to-farmer aquaculture knowledge transfer among farmers in the Edo South Zone. The specific objectives are to:

i. Examine the socio-economic characteristics of aquaculture farmers in the study area;

ii. Ascertain the level of participation of aquaculture farmers in farmer-to-farmer knowledge transfer initiatives in the study area:

ii. Determine the motivations of aquaculture farmers in farmer-to-farmer knowledge transfer in the study area; and

iv. Examine the constraints faced by aquaculture farmers in participating in farmer-to-farmer knowledge transfer in the study area.

1.5 Justification of study

Current formal agricultural extension services still face significant systemic limitations in effectively reaching and supporting small-scale farmers (Agbamu, 2000; World Bank, 2007).

This study will provide knowledge on the participation level of aquaculture farmers in farmer-to-farmer knowledge transfer initiatives and the motivations of aquaculture farmers to participate in knowledge transfer, it will also help provide knowledge to the

aquaculture farmers, the extension workers, researchers, agricultural extension workers and agencies and policy makers.

1.6 Hypothesis of the study

The null Hypothesis states that:

H01: There is no significant relationship between the socio-economic characteristics of aquaculture farmers and their level of participation in farmer-to-farmer knowledge transfer initiatives in the Edo South Zone.

H02: There is no significant relationship between specific motivations (intrinsic and extrinsic) and aquaculture farmers' level of participation in farmer-to-farmer knowledge transfer in the Edo South Zone.

CHAPTER TWO

LITERATURE REVIEW

2.1 Farmer-to-Farmer Extension

Farmer-to-farmer extension represents a paradigm shift in agricultural development, moving away from the traditional linear model of technology transfer from researchers and extension agents to farmers. Instead, it recognizes farmers as active agents in the generation and dissemination of agricultural knowledge (Van Mele, 2010). This study emphasizes on the importance of viewing agricultural knowledge and information system, sharing and utilizing agricultural knowledge and information, basically the role of information and communication in agricultural development (Rolling, 1988).

This reviews the importance of recognizing and valuing the local knowledge of the farmers and the involvement of farmers more when carryout agricultural research (Sumberg & Okali 1997).

2.1.1. Key principles

The effectiveness of farmer-to-farmer extension rests on core principles, extension workers push to work with farmers not just to teach them but using methods where everyone participates and adapts together, being flexible and changing the whole system to support, Identifying and supporting innovative or lead farmers within communities is another key principle (Hagmann *et al*. 1998). These individuals often possess a knack for

experimentation and are respected by their peers, making them effective catalysts for knowledge sharing (Gladwell, 2000).

2.1.2. Advantages in Agricultural Development

The advantages of farmer-to-farmer extension are multifaceted. It has the potential to significantly enhance the adoption of new technologies and practices because farmers are more likely to trust information coming from individuals they know and respect, farmer-to-farmer extension is a promising way to improve agriculture because farmers trust each other's practical advice, which is often relevant and cost-effective (Alam *et al*. 2014). It shows that this farmer-to-farmer approach helps spread the adoption of these practices effectively because farmers trust and learn well from each other (Davis & Franzel, 2012).

2.2 Farmer-to-Farmer Knowledge Transfer:

Farmer-to-farmer knowledge transfer is the operational mechanism through which farmer-to-farmer extension occurs. It specifically describes the direct exchange of agricultural knowledge, innovations, and practices between farmers, It is important for agricultural experts to not ignore the traditional knowledge of farmers, rather understand them and work with farmers knowledge to find better solutions (Bentley, 1992). This process is often informal and embedded within existing social relationships and community structures which needs more communication and interaction among everyone involved – farmers, researchers, etc. This helps people learn from each other, It's not just about giving advice but about talking and working together (Leeuwis, 2004). The

channels of transfer can vary widely, including farm visits where farmers demonstrate their techniques, group meetings and discussions focused on specific challenges or innovations, informal conversations during social gatherings, and the sharing of resources and materials,

2.2.1. Characteristics and Advantages

Several characteristics define Farmer-to-farmer Knowledge Transfer, This looks at how agricultural extension moves away from just telling farmers what to do. Instead, it focuses on the idea of everyone learning and working together – farmers, extension workers, researchers – to come up with better solutions and trust for agriculture, also talks about how this new, more collaborative way of doing things needed changes in how the extension organizations themselves were run (Hagmann & Chuma, 1998). This basically says that good agricultural extension is not just about giving farmers new materials, It is really about setting up smart ways for everyone involved in agriculture to share information and learn from each other. Actually like building a strong communication network so that the right knowledge gets to the right people at the right time to help improve farming (Röling, 1988). Finally, Farmer-to-farmer leads to the empowerment of farmers by recognizing and valuing their indigenous knowledge and enabling them to become active participants in agricultural development as both learners and teachers (Röling, 1988).

2.2.2. Relevance to Aquaculture

In the specialized field of aquaculture, Farmer-to-farmer knowledge transfer holds particular promise. The fine points of fish farming, such as selecting appropriate species for local conditions, managing water quality, controlling diseases specific to the region, and accessing local markets, often require highly localized knowledge. This farmer-to-farmer knowledge transfer helps sustainable methods of farming spread more effectively (Lightfoot & Noble, 1993).

2.3 Farmer-to-Farmer Extension in Aquaculture

In Agricultural Systems, this study emphasizes that how farmers interact and learn from each other socially is a really important factor in whether new farming ideas get adopted and spread successfully in Africa. It is not just about the technical details of an innovation; the social connections and knowledge sharing among farmers play a key role. Farmers are constantly trying out new things on their farms, and through these experiments, they develop their own unique and practical knowledge about what works best in their local conditions. (Campenhout & Leeuwis, 2010).

De & Saha (2013) shows that Aquaculture Field Schools are a good method for getting fish farmers to learn from experts and, more importantly, to teach each other what they know, which helps spread good aquaculture practices within the farming community.

Kumaran *et al* (2012), paper looks at different ways to provide advice(Diversifying Extension Methods, Farmer-to-Farmer Learning, Demonstration and On-Farm Trials, Use of Mass Media and ICTs, Group Approaches, Market Linkages, Sustainable

Practices) and support to fish farmers tries to figure out the best methods [Farmer Field Schools (FFS), Group meetings and discussions, Use of audio-visual aids, Mobile based extension, Interactive radio programmes) to help them improve their fish farming practices.

2.3.1. Global Perspective

The application of Farer-to-farmer extension in aquaculture and agriculture has seen varying degrees of success and faced distinct challenges across different countries.

A) **Successes:** Everett Rogers' "Diffusion of Innovations" explains how new ideas and technologies get accepted and spread among people. It looks at things like how good the new idea seems, how people hear about it, how long it takes for different groups to adopt it, and the social influences that play a role in whether people decide to use something new. The 2016 JICA & NACA explains how to use experienced fish farmers to teach other fish farmers in their community about small-scale freshwater aquaculture. It focuses on training a few key farmers who then share their knowledge with others, using local methods and language, to help more people farm fish successfully and sustainably (in places like Cambodia).

A manual that guides us on how to create and manage Farmer Field Schools right here in Nigeria, or anywhere else. These schools are all about farmers learning by doing things themselves in their own fields, working together, and figuring out solutions as a group,

instead of just being told what to do. The idea is to help farmers become the real experts in their own farming (FAO, 2003).

B) **Challenges:** Despite its successes, Farmer-to farmer extension faces several challenges globally. The FAO discusses the challenges and suggests ways to make this happen effectively, so that more farmers can get the information they need for both their crops and their fish, potentially leading to better and more sustainable farming practices around Ibadan and Nigeria as a whole. This also explains how using farmers themselves to teach other farmers is a valuable way to share agricultural or aquaculture knowledge, potentially right here in Nigeria. It highlights the benefits of this method, being cost-effective, using locally relevant advice, and building trust among farmers in communities around Nigeria and beyond, ultimately leading to more farmers adopting better practices.

This model is also a guide on how to mix fish farming with other farming like raising chickens or growing vegetables, possibly around Nigeria. The idea is that the waste from one part of the farm can help another part, making the whole system more efficient, environmentally friendly, and providing farmers with more ways to earn money (Edward, 2003).

2.3.2 Nigerian Context

In Nigeria, the history and role of farmer-led extension in aquaculture are intertwined with the broader agricultural extension landscape and the specific development of the aquaculture sector.

History and Role of Farmer-Led Extension in Nigerian Aquaculture: This is a key resource that explains the main ideas and methods behind agricultural extension – the work of helping farmers improve their farming. It covers things like how to communicate effectively with farmers, different ways to teach them new techniques, how to plan and check if extension programs are working, and the important role of the people who work directly with farmers, potentially offering valuable lessons for agricultural development efforts across Nigeria (Van den Ban & Hawkins, 1996).

This study argues that to achieve environmentally sound and lasting agriculture in a world facing unpredictable environmental changes, we need to move away from simply telling farmers what to do. Instead, it champions approaches where farmers actively participate in learning and problem-solving, and where management strategies are flexible and adapt based on ongoing experience (Röling *et al*.1998).

This model says that we learn best by doing things with others who care about the same things. These groups, or "communities of practice," are not just about getting information; they are about becoming part of a group, understanding what is important to them, and shaping who we are through shared experiences and ways of doing things. Learning is not just in our heads; It is in how we connect and act with others (Wenger, 1998).

The FAO focuses on helping small farmers in Sub-Saharan Africa learn better ways to raise fish. They emphasize working with farmers, teaching them practical skills, sharing good technologies, and connecting them to the right resources and markets. The goal is to boost fish production in a way that helps people, strengthens the economy, and ensures food for the future in the region.

The adoption of approaches like Farmer Field Schools (FFS), which inherently involve farmer-to-farmer learning, has been explored in Nigerian agriculture and aquaculture as a way to empower farmers and enhance technology adoption (Aquaculture Field School to Promote Farmer-to-Farmer Extension).

2.3.3. Current Status in Edo State and National Extension Policy Frameworks

The current status of farmer-to-farmer extension in aquaculture in Edo State, to the best of current knowledge, may not be extensively documented as a formal, widespread government-led program.

Based on this study, extension services in the context of fish farming in Ekiti State, Nigeria, generally refer to the provision of information and support to fish farmers to improve their practices and profitability. These services are often delivered by extension agents and may include the following:

a) Information Dissemination: Providing farmers with crucial knowledge and information related to fish farming. This can cover various aspects such as:

- Pond construction and management
- Fish stocking
- Fish breeding techniques
- Fish harvesting
- Feed formulation and management

b) Technical Advice: Offering guidance on improved fish farming technologies and practices.

c) Support Services: Assisting farmers with accessing resources and inputs, which may include:

- Credit and financing
- Marketing outlets

d) Training and Education: Conducting educational programs to enhance farmers' skills and knowledge.

The goal of these extension services is to bridge the gap between research and practice, enabling fish farmers to adopt better methods, increase their production, and ultimately improve their economic well-being (AgEcon Search, 2012).

Based on this study, here are some the key points about the adoption of aquaculture technology by fish farmers in Imo State, Nigeria:

a) Low Adoption Rates: Studies indicate that the adoption rate of new aquaculture technologies among fish farmers in Imo State has been low.

b) Factors Affecting Adoption: Several factors influence the adoption of these technologies, including:

- Financial Constraints: Farmers often lack the necessary funds to invest in new technologies, maintain ponds, and purchase inputs like feed.
- Inadequate Extension Support: Insufficient access to effective extension services hinders the dissemination and proper implementation of new technologies.
- Pond Issues: Problems with pond construction, often not meeting recommended specifications, can impede the adoption of other recommended practices.

c) Technology Package: Efforts to improve aquaculture practices in the region have involved disseminating technology packages to farmers. These packages typically include practices related to:

- Pond site selection
- Pond construction and installation
- Pond preparation
- Fish stocking
- Fingerling transportation

- Fish feeding
- Pond maintenance
- Fish harvesting
- Fish preservation

In essence, while there are efforts to introduce improved aquaculture technologies, various challenges have hindered their widespread adoption among fish farmers in Imo State (Adoption of Aquaculture Technology by Fish Farmers in Imo State of Nigeria).

This study evaluated how well agricultural support and information helped farmers and their economic situation in two specific areas of Edo State, Nigeria (Esan Southeast and Esan Central). They looked at assessed the impact of agricultural extension services on farmers (Alakpa & Ehigie).

The FAO publication by Swanson, Rajalahti & Malik (2010) looks at successful ways agricultural advice and support are given to farmers around the world. It tries to figure out what works best to help farmers improve their lives and take care of the environment.

Nigeria's Agricultural Transformation Agenda (ATA) was a government initiative ran from 2011 to 2015 aimed at modernizing the agricultural sector. Its goals included increasing food production, creating jobs, diversifying the economy, and ensuring food reaches consumers. The Agricultural Transformation Agenda aimed to attract private investment, reduce post-harvest losses, add value to local produce, develop rural

infrastructure, and improve access to finance and markets for farmers and other value chain actors.

2.4 Participation in knowledge transfer

Ndekha *et al*. (2003) define participation as a community-driven process where people in a specific area, who share similar problems, actively figure out what they need, decide what to do, and then work together to make it happen. It's about a group taking charge to solve their own issues.

In participation, farmers and communities must actively participate in learning and problem-solving. Emphasizes that top-down approaches (Decision-making from experts and leaders or focus on expert knowledge) do not work because farming is complex and local, so we need methods where everyone learns together and values farmers' knowledge to find the best, most sustainable ways to grow food (Pretty, 1995).

Arnstein's "Ladder of Citizen Participation" is a model with eight levels showing how much say people have in decisions that affect them. The bottom rungs represent no real power (like manipulation or just being told things), the middle rungs show some input but limited influence (like consultation), and the top rungs represent real power and control by citizens in the decision-making process. It is a way to analyze how genuine citizen involvement actually is.

2.4.1. Types and Levels of Participation

Farmers' engagement in knowledge transfer can manifest in various forms, reflecting different levels of commitment and organizational structures.

1. Voluntary vs. Organized Participation:

• Voluntary Participation: This says that to be happy and do well, it is not just about what goals you have (like money or growth), but why you are pursuing them. If your goals align with your basic needs for feeling in control (autonomy), capable (competence), and connected (relatedness), you will be much better off. Pursuing goals for internal reasons or because they truly matter to you is better than doing it for external pressure (Deci, E.L 2000). Agricultural extension should focus on communication to help rural areas innovate. Innovation happens through talking, learning together, and working with everyone involved – farmers, researchers, etc. It is about more than just passing on information; it is about building connections and understanding different viewpoints to create real change (Leeuwis, 2004).

• Organized Participation: The FAO's guide on Farmer Field Schools (FFS) puts organized participation at its heart. Farmers learn and make decisions together in groups, sharing a field and analyzing results. This teamwork builds their skills, confidence, and community connections, making them more self-reliant and able to share their knowledge. It is all about learning and acting collectively (FAO, 2003). Farmer field school: A guide for the establishment and operation). This model says that getting farmers to work

together in organized groups is key. This allows them to identify their needs, do their own experiments, share knowledge, and demand what they need from extension services. It is about empowering farmers through collective action and learning (Scarborough, 1997).

2. Formal vs. Informal Engagement

- Formal Engagement: Formal engagement often involves designated roles and responsibilities for participants and facilitators. This study emphasizes that to really link local knowledge with global science for managing nature, we need formal ways for everyone to participate. This means creating structured platforms for discussion, formally including local knowledge in research, jointly deciding what to study, working together on experiments, getting regular feedback, and building institutions that know how to involve people properly. It is about making sure everyone's voice is heard and that local wisdom truly shapes solutions (Braun, 2006).

- Informal Engagement: Informal engagement can be highly influential due to trust and shared context but may be less documented and harder to leverage systematically. Based on the focus, this study says we learn and form our identities by being together and doing things informally with people who share same interests. Just chatting, sharing experiences, and helping each other is how we learn the basis, build connections, and find out who we are within that group. It is the everyday, unstructured interactions that really matter (Wenger, 1998).

3. Role of Community-Based Organizations and Cooperatives: This shows that when communities organize into groups like cooperatives, they are much better at managing shared resources. These groups help people talk, set rules, watch out for the resource, solve problems, and work together. This organized participation builds trust and empowers locals to take care of the resources they depend on (Ostrom, 1990). This also shows that community groups and cooperatives are key for getting people involved in development. They build trust and connections within the group, link members outward to resources, and give them a voice to influence things. These organizations help people work together, solve problems, and have more power because they are connected. Strong social ties within these groups drive participation and lead to better development outcomes (Woolcock & Narayan, 2000).

2.4.2. Factors Influencing Participation

Several interconnected factors influence farmers' willingness and ability to participate in Farmer-to-farmer knowledge transfer activities. Access to resources, including land, capital, and time, plays a crucial role. Farmers with more resources may be better positioned to experiment with new practices and share their experiences. This work emphasizes that genuine participation and effective communication are inseparable for driving meaningful rural innovation. This provides a theoretical framework and practical examples for rethinking agricultural extension as a more interactive, learning-oriented, and participatory endeavor (Leeuwis, 2004). It shows that different types of people adopt

new ideas at different times and that things spread through communication and influence. For participation to work, it needs to be seen as better, fit in with local ways, be easy to understand, and show positive results. Also, key people in the community can really help get others involved. So, it is about understanding how ideas catch on to get more and more people to participate (Rogers, 2003).

2.5. Motivation in knowledge transfer:

Motivation refers to the process that initiates, guides, and maintains goal-oriented behaviors.

The study says people participate for different reasons: either because they genuinely enjoy it and find it interesting, which is intrinsic motivation, or because they want something else like rewards or approval, which is extrinsic motivation. It also shows that even with extrinsic reasons, if people start to value the activity and see it as important to them, their participation becomes more willing and better. The key to getting good participation is to make people feel like they have a choice (autonomy), are good at it (competence), and feel connected to others (relatedness), (Ryan & Deci, 2000). This study also suggests that for motivations to effectively lead to knowledge sharing, individuals need to feel a sense of social connection rather than having a sense of separation (alienation). The presence of alienation can essentially block the positive influence of even strong motivations (Guo, 2023).

2.5.1. Intrinsic Motivation

The study emphasizes that the best kind of motivation for reaching goals and feeling good comes from having our core needs met: feeling in control, which is autonomy, capable, which is competence, and connected, which is relatedness. Also states that when we pursue goals for reasons that align with these needs and feel like we have a choice, are good at it, and belong, we are more likely to succeed and be happy (Deci & Ryan, 2000).

2.5.2. Intrinsic Motivational Factors: The Inner Drive to Share

This model says that activities that allow individuals to feel autonomous, competent, and related are more likely to spark and sustain their intrinsic motivation, leading to greater engagement, enjoyment, and well-being (Deci, 2000). These internal drivers are often more sustainable in the long run as they are not dependent on external rewards.

1) Altruism (The Desire to Uplift Others): This provides a focused examination of the individual, internal factors that make people more involved and to act selflessly (Leontiev , 2019). These internal factors are:

a) Personality Traits: These are relatively stable and enduring patterns of thoughts, feelings, and behaviors that predispose individuals towards altruism. Key traits include:

- Empathy: The ability to understand and share the feelings of others. High empathy allows individuals to feel the distress of others, motivating them to help.

- Compassion: A feeling of concern for others' suffering and a desire to alleviate that suffering. This emotional response often translates into helping actions.

- Honesty-Humility: Individuals high in this trait tend to be sincere, fair, and modest, often acting altruistically without seeking personal recognition or gain.

b) Motivational Factors: These are the underlying reasons and drives that compel individuals to act altruistically:

- Empathic Concern: A genuine, other-oriented emotional response to someone in need, driving a desire to help that person specifically (as proposed by the empathy-altruism hypothesis).

- Intrinsic Rewards: For some individuals, the act of helping itself can be inherently satisfying and aligned with their sense of self, leading to repeated altruistic behavior.

- Desire to Uphold Moral Principles: A strong commitment to fairness, justice, and caring for others can internally drive altruistic actions.

This study basically says that companies innovate by actively creating and using knowledge, both the hard-to-explain knowledge (know-how) and the easily written explicit knowledge (facts), (Nonaka *et al*. 1995). Their key idea is the SECI model:

- Socialization: Sharing understood knowledge through experience.

- Externalization: Turning omplicit knowledge into explicit knowledge.

- Combination: Combining different pieces of explicit knowledge.

- Internalization: Learning explicit knowledge until it becomes understood.

2) Personal Growth and Learning Through Sharing: This study looks at what makes employees want to share their knowledge. It finds that internal rewards (like feeling helpful) often work better and last longer than external rewards (like bonuses) for encouraging knowledge sharing (Lin, 2007). It also suggests that building a strong knowledge-sharing environment requires tapping into what genuinely motivates employees, which often goes beyond just external incentives. It's about creating a workplace where people want to share because they see the value in it and feel good about contribution.

A significant part of our identity comes from the groups we belong to, we are motivated to see these groups positively, and it shapes our perceptions, our feelings, and our behavior towards both our own group and other groups. It is a fundamental aspect of how we navigate the social world and build our sense of self (Hogg, 2003).

3) Community Recognition: The Theory of Planned Behavior says your intention to do something is shaped by your attitude towards it, what others think you should do (subjective norm), and how easy you think it will be (perceived behavioral control). Intention is the main predictor of behavior, but if you feel really in control, that can also directly influence what you do (Ajzen, 2020).

2.5.3. Extrinsic Motivation

In extrinsic motivation, it shows that people are more likely to participate if they believe it will lead to external rewards or avoid negative consequences like attitude, if important

people in their lives expect them to participate (subjective norm, a form of social extrinsic pressure), and if they believe they have the means and opportunity to participate successfully and gain those external outcomes (perceived behavioral control). So, extrinsic motivation plays a role in all three factors influencing the intention to participate (Ajzen, 1991).

In another view, says that while offering rewards can get people to participate initially, it is not always the best approach. Sometimes, it can actually decrease participation in the long run by making people less interested in the activity itself or by changing how they see it (for example, making a good deed seem like it's just about the money). The way you offer incentives and the situation really matter for whether they work or backfire. So, just paying people to participate is not a guaranteed solution (Gneezy *et al*. 2011).

2.5.5. Social Cognitive Theory:

Bandura's Social Learning Theory (1977) shows that we learn to participate by watching others. If we see people like us being rewarded for participating, we are more likely to do it ourselves. Also, if we believe we are capable of participating effectively (self-efficacy), we are much more likely to get involved. Our behavior, our beliefs, and our environment all influence each other in whether or not we participate. So, seeing positive examples and feeling confident are key to getting people to participate.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Area and Scope of Study

Edo State is a state located in the South-South geopolitical zone of the federal republic of Nigeria. The state's capital and largest city, Benin City, is the fourth largest city in Nigeria and is a major urban center with cultural, economic and historical significance. Bordered by Kogi State to the northeast and east, Delta State to the southeast and south, and Ondo State to the west and northwest, Edo State located within the rainforest belt of Nigeria, providing a suitable climate for aquaculture. The state covers an area of approximately 19,559 square kilometers and has a population of over 4 million people, according to the last national census conducted in 2006.

Edo State is administratively divided into eighteen (18) Local Government Areas; Akoko-Edo, Egor, Esan Central, Esan North-East, Esan South-East, Esan West, Etsako Central, Etsako East, Etsako West, Igueben, Ikpoba-Okha, Oredo, Orhionmwon, Ovia North-West, Ovia South-West, Owan East, Owan West, and Uhunmwonde with some of the most prominent for catfish farming being Ovia North-East, Oredo, Esan West,

Ikpoba-Okha, and Etsako West. The economy of the state is largely agrarian, with farming, fishing, and agro-based industries being key contributors.

The climate of Edo State is characterized by two main seasons: the rainy season (April to October) and the dry season (November to March). The state receives an average annual rainfall ranging from 1,400mm to 2,700mm, which supports the agricultural activities and aquaculture. The temperature in the state generally ranges between 24°C and 34°C throughout the year, which is favorable for catfish farming as catfish thrive in warm water environments.

The state has a diverse landscape, including lowland rainforests, swamps, rivers, and streams that provide natural water resources for aquaculture. The major rivers such as the River Niger and its tributaries, Ovia River, Ikpoba River, along with smaller streams and creeks, offer opportunities for fish farming in ponds and cages. This geographical advantage has encouraged many farmers to engage in fish farming, particularly catfish, which is adaptable to various water conditions.

The scope of this study will include the participation and motivation in farmer-to-farmer aquaculture knowledge transfer.

3.2 Sample size and sampling Procedure

The multistage sampling procedure was used in this research work. The first stage was the selection of an Agricultural Zone in Edo State by Purposive Sampling. This was done

to categorize Edo State into its three agricultural zones which are Edo South, Edo Central, and Edo North. There are three agroecological zones in the state as stated above and Edo south was selected.

The second Stage was the purposive selection of Ikpoba-Okha Local government area that is significant in aquaculture in the Edo South Zone.

The third stage was the purposive selection of 3 cluster communities in Ikpoba-Okha LGA where aquaculture is predominant. The cluster communities include; Uteh Cluster, Ogheghe Cluster, and Uruokhosa Cluster.

The fourth and final stage was a random selection of 120 respondents from the study. This was done using the list of aquaculture farmers obtained from extension officers in the selected cluster communities.

3.3 Data Collection

Data for this study was obtained from primary source only. Data was gathered in the field using structured questionnaire, The questionnaire was validated by expert evaluation, and its reliability was tested using the test-retest method.

3.4 Measurements of Variables

The two groups of variables that was measured in this section are the independent and dependent variables.

3.4.1 Independent Variables

3.4.1.1 Socioeconomic Characteristics of Aquaculture Farmers

Age: It was measured using scale variable where the respondents were asked their age in years. This was categorised, and the average was calculated to have the average age of the respondents.

Sex: It was measured on the nominal scale as either male or female. It was recorded by observation, with male coded as "M" and female as "F".

Religion: It was measured in the nominal scale by categorizing them into Christianity, Islam, and Traditional religion.

Marital Status: It was measured on the nominal level by categorizing them into Single, Married, Separated, and Divorced.

Household size: It was measured on the interval level by asking the respondents to state the number of persons who feed from the same pot.

Highest level of Education: This was measured as No formal education, Primary, Secondary or Tertiary.

Primary scale of aquaculture operation: This was measured as Small scale (e.g., backyard ponds, few tanks), Medium scale (e.g., several ponds/tanks, commercial intent), Large scale (e.g., extensive ponds industrial production).

Occupation of the Respondents: Occupation was measured at the nominal level with only two categories of 'yes' as '1' to indicate that catfish farming is their primary occupation and 'No' as '2' to indicate that catfish is not their primary occupation.

Extension contact: Respondents were asked to indicate whether they have had contact with an extension agent (Yes or No).

Ponds stocked: Respondents were asked to indicate how many ponds they currently had stocked by writing the exact number.

Primary occupation: Respondents were asked to indicate whether aquaculture was their primary occupation (Yes or No).

3.4.2 Dependent Variables

Participation of aquaculture farmers in farmer-to-farmer knowledge transfer: Respondents were asked to indicate the participation level in farmer-to-farmer knowledge transfer. This was measured using a 5-point Likert scale ranging from Strongly Agree to Strongly Disagree.

Motivation of aquaculture farmers in farmer-to-farmer knowledge transfer: Respondents were asked to indicate the motivations that influence aquaculture farmers

participation in farmer-to-farmer knowledge transfer. This was measured using a 5-point Likert scale ranging from Strongly Agree to Strongly Disagree.

Constraints faced by aquaculture farmers in farmer-to-farmer knowledge transfer: Respondents were asked the challenges they face in farmer-to-farmer knowledge transfer. This was measured using a 5-point Likert scale ranging from Strongly Agree to Strongly Disagree.

3.5 Analytical Techniques

The data was analyzed using both descriptive and inferential statistics

Objective 1: To examine the socio-economic characteristics of aquaculture farmers in the Edo South Zone was analyzed by descriptive statistics such as frequency or percentage.

Objective 2: To ascertain the level of participation of aquaculture farmers in farmer-to-farmer knowledge transfer initiatives in the Edo South Zone. The analysis was utilized using frequency counts and percentages.

Objective 3: To determine the motivations that influence aquaculture farmers' participation in farmer-to-farmer knowledge transfer in the Edo South Zone, was obtained using mean and standard deviations.

Objective 4: To examine the constraints faced by aquaculture farmers in participating in farmer-to-farmer knowledge transfer in the Edo South Zone, percentages, means, and frequencies was used for analysis.

The objectives was analyzed using descriptive statistics such as mean, frequency count, standard deviation and percentage.

HYPOTHESES

The null hypotheses states that

H01: There is no significant relationship between the socio-economic characteristics of aquaculture farmers and their level of participation in farmer-to-farmer knowledge transfer initiatives in the Edo South Zone.

H02: There is no significant relationship between specific motivations (intrinsic and extrinsic) and aquaculture farmers' level of participation in farmer-to-farmer knowledge transfer in the Edo South Zone. Were both tested using Pearson correlation.

Pearson correlation formular:

$$\mathbf{r} = = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\left[\sum(X - \bar{X})^2\right]\left[\sum(Y - \bar{Y})^2\right]}}$$

Where:

X = Participation of aquaculture farmers

Y = Motivation of aquaculture farmers

r = Pearson correlation coefficient

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Aquaculture Farmers

4.1.1 Gender

Results in Table 4.1 shows that a greater proportion fish farmers in the study area (52%) were male, while (48%) were female. This implies that both males and females are actively involved in fish farming activities. This is in contrasts with findings of Ogunbameru *et al*. (2019) and Olagunju *et al*. (2020), who reported that fish farming in most Nigerian states was largely dominated by males due to land ownership constraints and physical labour demands. However, these result aligns with Agbabiaka and Okeke (2024), who reported a growing participation of women in aquaculture in Imo State, Nigeria.

4.1.2 Age

As shown in Table 4.1 the majority (36%) are between 35 – 44 years, followed by 45 – 54 years (34%), 25 – 34 years (19%), and 55 and above are 10%. The average age is 43, which shows that the population is dominated by people in their productive ages. It is, therefore, clear that fish farming activities are dominated by middle-aged people who are active, productive, and innovative enough to pursue innovative approaches. The result supports the findings by Adeleke *et al*., 2022, which indicated that the actively involved group between 35 and 50 years are the most actively involved in fish farming activities in Southwest, Nigeria. The low involvement by those below 25 may point to a lack of involvement by the youth, as advocated by Ayanboye *et al*., 2020, which indicated that the youths perceive aquaculture as a capital-intensive enterprise, meaning that involving youths could enhance the continuation of the knowledge chain as related to the aquaculture enterprise.

4.1.3 Marital Status

Results in Table 4.1 also shows that most respondents were married (69%), 25 % were single, 3 % divorced, and 3 % widowed. The dominance of married respondents suggests that enhances cooperative relationships and strengthens social networks, which are vital for effective peer-to-peer information exchange (Abiona *et al*., 2021). This finding agrees with Olawale and Ogunwale (2023), who reported that marital stability positively influences farmers' participation in group learning and cooperative extension. Married

farmers often have stronger local ties, enabling easier trust formation in farmer-to-farmer knowledge systems.

4.1.4 Educational Level

Results further showed that 49% of respondents had secondary education, 48 % had tertiary education, and 3 % had primary education. This result indicates a high literacy level among fish farmers. According to Ishola and Salami (2020), education enhances awareness, comprehension, and adoption of improved technologies. It also increases farmers' ability to communicate effectively within peer networks, facilitating mutual learning (Ishola and Salami, 2020). The high proportion of tertiary educational level is in contrasts with national averages reported by FAO (2022), where smallholder farmers in Nigeria often have secondary or lower education. This educational advantage implies that farmers have better capacity for interpreting technical information and participating actively in farmer-to-farmer knowledge transfer programs.

4.1.5 Household Size

Results in Table 4.1 also shows that most households (88 %) had fewer than five members, with a mean household size of 3 persons. A small household size suggests fewer dependents and potentially greater flexibility for farmers to participate in knowledge-sharing activities. Mohammed *et al*. (2023) found that smaller households

often correlate with higher participation in extension activities, as time and resources can be allocated more efficiently.

4.1.6 Primary Occupation

Results also shows that Aquaculture was the primary occupation for 62 % of respondents, followed by crop farming (19 %), trading (10 %), and civil service (9 %). The majority of farmers identifying aquaculture as their main occupation indicates a strong professional commitment to fish farming. This result is in consistent with Olagunju *et al*. (2020), who found that aquaculture farmers primarily dependent on fish farming tend to participate more in knowledge networks compared to those treating it as a secondary occupation.

4.1.7 Years of Experience

As shown in Table 4.1, the majority (75%) of farmers possessed experience between 5–10 years, followed by 16% having <5 years of experience, 9% having experience between 11–15 years, and no farmer possessing experience >15 years. The large share of farmers possessing experience between 5–10 years shows that the farmers are of intermediate experience levels. This is the best level required for networking, whereby these farmers have requisite knowledge but are also open to new technologies and innovations (Izadi *et al*., 2024). This has also been supported by other studies (Rehman *et al*., 2021), who concluded that farmers of moderate experience are more engaged and participative within knowledge networks than beginners and experts.

4.1.8 Annual Income

As shown in Table 4.1 farmers' annual income ranged from ₦1.2 million to ₦5.5 million, with a mean of ₦2.39 million. About 70 % earned ₦1–3 million, 28 % earned ₦3–5 million, and only 2 % earned above ₦5 million. This income profile indicates that most farmers operate at a moderate commercial scale. Income level is often linked with investment capacity and openness to innovation (Modirwa, 2019). Adeleke *et al*. (2022) observed that aquaculture farmers with higher income demonstrate greater willingness to engage in cooperative extension and peer mentorship.

4.1.9 Contact with Extension Agents

As shown in Table 4.1 about 46 % of farmers had contact with extension agents, while 54 % had none. Among those with contact, 52 % interacted monthly, 29 % fortnightly, and 19 % weekly. The low frequency of extension contact confirms the persistent gap in public extension coverage, echoing findings by Agbamu (2000). The fact that more than half of respondents lacked regular contact highlights the relevance of farmer-to-farmer knowledge transfer as an alternative dissemination mechanism.

Table 4.1 Socioeconomic Characteristics

		Frequency	%	Minimum	Maximum	Mean
Gender	Male	61	52			
	Female	57	48			
Age	< 25.0	0	0	25.0	60.0	43
	25.0 - 34.0	23	19			
	35.0 - 44.0	43	36			
	45.0 - 54.0	40	34			
	55.0 and above	12	10			
Marital Status	Single	29	25			
	Married	82	69			
	Divorced	4	3			
	Widowed	3	3			
Educational Level	No formal education	0	0			
	Primary education	3	3			
	Secondary	58	49			

		Frequency	%	Minimum	Maximum	Mean
	education					
	Tertiary education	57	48			
	Others	0	0			
Household size	< 5.0	104	88	1.0	6.0	3
	5.0 and above	14	12			
Primary Occupation	Aquaculture	73	62			
	Crop farming	22	19			
	Civil service	11	9			
	Trading	12	10			
Years of Experience	Less than 5 years	19	16			
	5 - 10 years	88	75			
	11 - 15 years	11	9			
	More than 15 years	0	0			
Estimated Annual Income	< 1000000.0	0	0	1200000	5500000	2385593.22
	1000000.0 - 2999999.0	83	70			
	3000000.0 - 4999999.0	33	28			
	5000000.0 and above	2	2			
Estimated No. of Fish Produced Per Year	< 1000.00	0	0	1200.00	79200.00	16397.03
	1000.00 - 20999.00	78	66			

		Frequency	%	Minimum	Maximum	Mean
	21000.00 - 40999.00	34	29			
	41000.00 - 60999.00	5	4			
	61000.00 and above	1	1			
Contact with Extension Agents	Yes	54	46			
	No	64	54			
Frequency of Contact with Extension Agents	Weekly	10	19			
	Monthly	27	52			
	Fortnight	15	29			

Source: Field survey, 2025

4.2 Level of Participation in Farmer-to-Farmer Knowledge Transfer

Results in Table 4.2 shows a strong peer-learning culture among aquaculture farmers, with respondents highly agreeing that they learn new techniques from fellow farmers ($\bar{x}$= 4.237) and regularly share knowledge within their networks ($\bar{x}$ = 4.169). These high scores reflect active information exchange and strong consensus across the group. Farmers also indicated that they attend meetings where experiences are shared ($\bar{x}$ = 3.805), although participation is slightly lower, suggesting potential barriers to regular attendance. Serving as mentors to less experienced farmers recorded moderate agreement ($\bar{x}$ = 3.729), indicating that only some farmers take on leadership roles within knowledge networks. Farmer-to-farmer learning as part of routine practice showed a slightly lower $\bar{x}$ =3.568, suggesting variability in how consistently it is integrated into daily farming operations. The weakest engagement was in farmer-led training and field demonstrations, $\bar{x}$ =3.331, highlighting limited participation in more structured peer-learning formats. In aquaculture specifically, peer-learning has been identified as a key mechanism for technology uptake when formal extension is limited (Atukunda, 2021). The sharing of information is a critical component of effective farmer-to-farmer knowledge transfer systems (Izadi *et al*., 2024).

Table 4.2 Level of participation in Farmer-to-Farmer Knowledge Transfer

	Mean	Std. Deviation
I learn new aquaculture techniques from fellow farmers	4.237	.7002
I regularly share farming knowledge with other aquaculture farmers	4.169	.5745
I actively attend meetings where fellow farmers share experiences	3.805	.5272
I serve as a mentor to less experienced aquaculture farmers	3.729	1.1373
Farmer-to-farmer learning is a major part of my farming routine	3.568	1.0083
I have participated in farmer-led training and field demonstrations	3.331	.9701

Source: Field survey, 2025

Therefore, mean > 3.0 means high participation

4.3 Motivation Influencing Participation in Farmer-to-Farmer Knowledge Transfer

Table 4.3 show that intrinsic drivers surpass material incentives within aquaculture networks in the Edo South Zone. The most powerful driver was the chance to acquire new ideas through interaction with others, with a mean of $\bar{x}$ =4.25, implying that learning and innovation are core to participation. This agrees with Izadi *et al*. (2024) and Atukunda (2021), who reported that smallholders are involved in peer learning principally to enhance competencies and problem-solving ability. Altruistic motivation also ranked high, as there was a high mean score for farmers who enjoy supporting others with a mean of $\bar{x}$ =4.01, reflecting strong social bonding in agreement with Nyasimi *et al*. (2019). Participation was further driven by social reinforcement from farmer groups, mean of $\bar{x}$ =3.98, gathering findings that community recognition strengthens engagement, Abiona *et al*. (2021). Instrumental motivation, such as perceived improvement in productivity, mean of $\bar{x}$ =3.70, though recognised, was secondary to intrinsic drivers and thus supported the findings of Adeleke *et al*. (2022). Status-related motivation, mean of $\bar{x}$ =3.35, was moderately influential, while economic incentives, mean of $\bar{x}$ =2.20, had the least influence to reinforce evidence that peer learning blossoms more on cognitive and social rewards than on material benefits, Rehman *et al*. (2021).

Table 4.3 Motivation Influencing Participation in Knowledge Transfer

	Mean	Std. Deviation
I learn new ideas from interactions during knowledge sharing	4.254	.6817
I participate because I enjoy helping other farmers grow	4.008	.7338
I am motivated by the support and recognition from local farmer groups	3.975	.6196
Knowledge sharing enhances my farm productivity	3.703	1.2562
Participation improves my reputation among fellow farmers	3.347	1.0571
Participation gives me access to farm inputs or group incentives	2.195	1.3666

Source: Field survey, 2025

4.4 Constraints to Participation in Farmer-to-Farmer Knowledge Transfer

Results in Table 4.4 highlight a number of constraints limiting effective participation in farmer-to-farmer knowledge transfer within the aquaculture sector of the Edo South Zone. The highest mean ($\bar{x}$ = 3.75) was recorded for lack of formal training on how best to share knowledge, revealing a capacity gap that ultimately influences farmers' ability to communicate, mentor, and structure information exchange. This agrees with Izadi *et al*. (2024) and Rehman *et al*. (2021), who note that peer-learning systems work best where participants have facilitation and communication skills. The second major constraint was the lack of organized platforms for knowledge exchange in aquaculture, which had a mean of $\bar{x}$ =3.50, showing institutional weaknesses that limit coordinated interaction. This is similar to the importance of structured forums and learning alliances that help to sustain farmer networks in other studies by Hermans *et al*. (2017); Nyasimi *et al*. (2019).

Moderate constraints included concerns about information credibility ($\bar{x}$ =3.02), and the distance to meeting venues ($\bar{x}$ =3.00), mirroring concerns pointed out by Pretty and Smith 2004 and Atukunda 2021. Also, communications or language limitations($\bar{x}$ =2.95) were a constraint, especially in linguistically diverse settings Modirwa, 2019. The least important constraint was lack of time ($\bar{x}$ =2.20); this can be interpreted that aquaculture farmers generally prioritize participation if motivated by perceived benefits, which is consistent with Adeleke *et al*. 2022.

Table 4.4 Constraints to Participation in Farmer-to-farmer Knowledge Transfer

	Mean	Std. Deviation
I have no formal training on how to share knowledge effectively	3.754	0.9052
There is no organized platform for aquaculture knowledge exchange in my area	3.500	1.2592
I do not trust the quality of information from fellow farmers	3.017	1.5469
Distance to training locations or meetings is a challenge	3.000	1.2265
Language barriers or communication issues affect my participation	2.949	1.3641
I lack time to participate in farmer-to-farmer knowledge sharing	2.195	1.3729

Source: Field survey, 2025

4.5 Knowledge Transfer Among Farmers

Table 4.5 shows that farmer-to-farmer interactions within the Edo South Zone have contributed a great deal to knowledge transmission along several core aquaculture practices. The highest diffusion rates were observed for pond construction (100 %) and drug administration (100 %), closely followed by harvesting (99.2 %) and feeding (94.9 %). This suggests that, in practice, nearly all farmers obtain the primary technical competencies from other farmers. This confirms the findings of Izadi *et al*. (2024) and Atukunda (2021) that routine operational knowledge is more easily transferred by means of informal networks. Full diffusion of drug-administration knowledge also supports Rehman *et al*. (2021), who indicated that peer learning is dominated by fish-health management due to its immediate economic significance.

For liming, stocking density, pond-water treatment, and fish processing, the observed levels of knowledge transfer were moderate: 76.3 %, 56.8 %, 56.8 %, and 58.5 %, respectively. These practices are somewhat more technical and/or require contextual interpretation, hence perhaps their lower diffusion levels. Indeed, according to the claims of Hermans *et al*. (2017), moderately complex innovations diffuse well when farmers have adequate absorptive capacity and strong relational ties.

On the other hand, the weak diffusion in pond fertilization (16.1 %), feed formulation (14.4 %), and marketing (39.0 %) indicate specialized skill requirements and limited value-chain engagement. These similar constraints are documented by Izadi *et al*. (2024)

and Adeleke *et al*. (2022). Moderate transfer of pond maintenance (45.8 %), preservation (49.2 %), and record-keeping (62.7 %) further indicates gaps in long-term management knowledge, again highlighting the need for more structured peer-led demonstrations.

Table 4.5 Knowledge Transfer Among Farmers

		Frequency	%
Pond construction	Received	118	100.0
	Not received	0	.0
Liming pond water treatment	Received	90	76.3
	Not received	28	23.7
Pond water treatment	Received	67	56.8
	Not received	51	43.2
Pond fertilization	Received	19	16.1
	Not received	99	83.9
Pond maintenance	Received	54	45.8
	Not received	64	54.2
Stocking density	Received	67	56.8
	Not received	51	43.2
Feeding	Received	112	94.9
	Not received	6	5.1
Feed formulation	Received	17	14.4
	Not received	101	85.6
Drug administration	Received	118	100.0
	Not received	0	.0
Harvesting	Received	117	99.2
	Not received	1	.8
Fish processing	Received	69	58.5
	Not received	49	41.5
Marketing	Received	46	39.0
	Not received	72	61.0
Preservation	Received	58	49.2
	Not received	60	50.8
Record Keeping	Received	74	62.7
	Not received	44	37.3

Source: Field survey, 2025

4.6 Relationship between the socio-economic characteristics of aquaculture farmers and their level of participation in farmer-to-farmer knowledge transfer in Edo South Zone.

As shown in Table 4. Results show that most socio-economic variables had weak, non-significant relationships with farmers' participation in knowledge transfer activities. Specifically, gender ($r = .021$; $p = .819$), age ($r = –.031$; $p = .737$), marital status ($r = –.058$; $p = .534$), educational level ($r = –.029$; $p = .751$), primary occupation ($r = –.049$; $p = .598$), years of experience ($r = .036$; $p = .697$), estimated annual income ($r = –.053$; $p = .569$), contact with extension agents ($r = –.085$; $p = .359$), frequency of contact with extension agents ($r = –.144$; $p = .307$), and estimated number of fish produced per year ($r = –.050$; $p = .590$) all exhibited statistically insignificant associations ($p > 0.05$). However, household size showed a negative and statistically significant relationship with participation in knowledge transfer ($r = –.250$; $p = .006$). This indicates that farmers with larger households tend to participate less actively in farmer-to-farmer knowledge exchange activities compared to those with smaller household sizes. The finding agrees with Rehman *et al*. (2021) who found that participation in farmer knowledge networks was largely determined by social capital and interpersonal communication frequency rather than age, income, or educational attainment.

Table 4.6 Relationship between the socio-economic characteristics of aquaculture farmers and their level of participation in farmer-to-farmer knowledge transfer in Edo South Zone

	Pearson Correlation	Sig. Level
Gender	.021	.819
Age	-.031	.737
Marital Status	-.058	.534
Educational Level	-.029	.751
Household size	-.250	.006
Primary Occupation	-.049	.598
Years of Experience	.036	.697
Estimated Annual Income	-.053	.569
Contact with Extension Agents	-.085	.359
Frequency of Contact with Extension Agents	-.144	.307
Estimated No. of Fish Produced Per Year	-.050	.590

Source: Field survey, 2025

4.7 Relationship between specific motivations (intrinsic and extrinsic) and aquaculture farmers' level of participation in farmer-to-farmer knowledge transfer in Edo South Zone.

As shown in Table 4.7 the Pearson correlation coefficient between motivation and the level of participation in farmer-to-farmer knowledge transfer was r = 0.427, with a p-value of 0.000, indicating a moderate positive and statistically significant relationship ($p < 0.01$). The strong and positive relationship observed between motivation and participation underscores the pivotal role of psychosocial and incentive-driven factors in fostering active engagement among aquaculture farmers. This finding aligns with the growing consensus that motivational drivers are fundamental to sustaining knowledge-sharing behaviors in agricultural systems (Izadi *et al*., 2024; Rehman *et al*., 2021). It demonstrates that when farmers perceive tangible or psychological benefits such as recognition, productivity improvement, or group belonging they are more likely to invest time and effort in disseminating and adopting new aquaculture practices.

Table 4.7 Relationship between specific motivations (intrinsic and extrinsic) and aquaculture farmers' level of participation in farmer-to-farmer knowledge transfer in Edo South Zone.

	Pearson Correlation	Sig. Level
MOTIVATION	.427	.000

Source: Field survey, 2025

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.2 Summary

This study investigated the participation and motivation in farmer-to-farmer aquaculture knowledge transfer among aquaculture farmers in Edo South Agricultural Zone, Nigeria. The research was designed to understand how socio-economic factors, motivational influences, and contextual constraints affect farmers' participation in peer-based knowledge exchange systems within the aquaculture subsector. The study was guided by four specific objectives; examine the socio-economic characteristics of aquaculture farmers in the study area; ascertain the level of participation of aquaculture farmers in farmer-to-farmer knowledge transfer initiatives; determine the motivations influencing aquaculture farmers' participation in farmer-to-farmer knowledge transfer and examine the constraints affecting aquaculture farmers' participation in farmer-to-farmer knowledge transfer.

Two null hypotheses were tested; H_{01}: There is no significant relationship between the socio-economic characteristics of aquaculture farmers and their level of participation in farmer-to-farmer knowledge transfer initiatives. H_{02}: There is no significant relationship between specific motivations (intrinsic and extrinsic) and aquaculture farmers' level of participation in farmer-to-farmer knowledge transfer.

A multistage sampling technique was employed to select 120 aquaculture farmers from three cluster communities across Ikpoba-okha LGA in Edo South Zone. Primary data were obtained through structured questionnaires validated by experts and tested for reliability using the test–retest method. Data were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations) and inferential statistics (Pearson correlation).

The results showed that aquaculture farming in Edo South is dominated by middle-aged farmers (mean age = 43 years), predominantly male (52%), and relatively well educated, with 97% having at least secondary education. The mean household size was three persons, and most respondents (62%) identified aquaculture as their primary occupation. The level of participation in farmer-to-farmer knowledge transfer was high, with mean scores ranging between 3.33 and 4.24 on a 5-point scale. Farmers frequently shared knowledge on pond construction, feeding, drug administration, and harvesting, reflecting strong peer-learning behavior. However, participation in knowledge areas such as feed formulation, pond fertilization, and marketing was comparatively low, suggesting technical and value-chain gaps.

Motivational analysis indicated that both intrinsic and extrinsic factors influenced participation, with intrinsic drivers (learning new ideas, enjoyment in helping others) ranking higher ($\bar{x}$ = 4.25) than extrinsic motivators (incentives and access to inputs; $\bar{x}$ = 2.20). This implies that farmers engage primarily out of a sense of shared learning and

social recognition rather than material gain. The major constraints identified were lack of formal training on effective knowledge sharing ($\bar{x}$ = 3.75), absence of organized platforms for aquaculture exchange ($\bar{x}$ 3.50), and lack of trust in peer information ($\bar{x}$ = 3.02). Correlation analysis showed that household size had a significant negative relationship (r = –0.250; p = 0.006) with participation in knowledge transfer, while other socio-economic factors were not significant. In contrast, motivation exhibited a positive and significant relationship (r = 0.427; p = 0.000) with participation, indicating that motivation substantially enhances farmers' engagement in knowledge-sharing activities.

5.2 Conclusion

The study concludes that farmer-to-farmer knowledge transfer represents an effective mechanism for disseminating aquaculture innovations among farmers in Edo South Zone. Participation in peer-based learning activities is generally high, particularly for practical and easily observable production tasks such as pond construction, feeding, and drug administration. However, participation declines in technically demanding or commercially oriented areas like feed formulation, fertilization, and marketing, revealing the need for enhanced technical capacity and structured support.

The findings confirm that motivation plays a central role in sustaining knowledge-sharing behaviors. Intrinsic motivations such as the desire to learn, social recognition, and the satisfaction derived from helping peers serve as stronger participation drivers than

extrinsic incentives. This underscores the importance of psychological and social capital factors in shaping participation dynamics in rural innovation systems.

Socio-economic characteristics such as gender, education, and income had limited influence on participation, suggesting that peer learning in aquaculture is socially inclusive and experience-driven, cutting across demographic boundaries. Nonetheless, larger household responsibilities were found to constrain active participation, possibly due to time and resource limitations.

5.3 Recommendations

Based on the findings, the following recommendations were made:

1. The Edo State Ministry of Agriculture and Food Security should facilitate the creation of structured farmer-to-farmer aquaculture knowledge platforms, with regular community-based workshops in collaboration with agricultural extension agencies.

2. Extension systems integrate technical modules on feed formulation, pond fertilization, and marketing into farmer-led training sessions.

3. Local farmer associations should implement motivational frameworks like "Lead Farmer Awards" or "Innovation Champion Programs" to maintain farmers' motivation for knowledge sharing.

4. A hybrid extension model should be adopted that links formal extension services with the informal farmer-to-farmer systems.

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APPENDIX

RESEARCH QUESTIONNAIRE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES
FACULTY OF AGRICULTURE
UNIVERSITY OF BENIN

Dear Respondents,

I am a final year student of the above named Department. I am conducting a research on "Participation and Motivation of Aquaculture Farmers in Farmer -To-Farmer Knowledge Transfer In Edo State."

I would like you to kindly answer the following questions as correctly as possible,as your honest and sincere response will aid the authenticity of this study. This research is strictly for academic purposes only and will be treated as such.

Thanks for your anticipated cooperation.

Vanessa Osaretin OMO-OSAGIE

Please kindly tick (✓) the appropriate box or fill in the blank spaces.

SECTION A: Socio-Economic Characteristics of Respondents

1. Gender: ☐ Male ☐ Female
2. Age: _____Years
3. Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed
4. Educational Level: ☐ No formal education ☐ Primary education ☐ Secondary education ☐ Tertiary education ☐ Others (Specify): _____
5. Household Size:_____ persons
6. Primary Occupation: ☐ Aquaculture ☐ Crop farming ☐ Civil service ☐ Trading ☐ Others (Specify): _____
7. Years of Experience in Aquaculture: ☐ Less than 5 years ☐ 5–10 years ☐ 11–15 years
   ☐ More than 15 years

8. Type of Aquaculture Practiced: ☐ Catfish ☐ Tilapia Others (Specify): _____
9. Annual Income from Aquaculture: ₦_____
10. Do you have contact with extension agents Yes ☐ No ☐
11. If yes how frequent: weekly ☐ monthly ☐ Fortnight ☐
12. How many ponds do you currently have stocked?
13. How many production cycles do you do per year?
14. Average number of fishes you have stock per production cycles?
15. Is this your primary occupation?

SECTION B: Level of Participation in Farmer-to-Farmer Knowledge Transfer

What is your level of participation in the following farmers to farmer knowledge sharing?

S/N	Statement	SA	A	N	D	SD
1	I regularly share farming knowledge with other aquaculture farmers.					
2	I have participated in farmer-led training or field demonstrations.					
3	I learn new aquaculture techniques from fellow farmers.					
4	I actively attend meetings where fellow farmers share experiences.					
5	I serve as a mentor to less experienced aquaculture farmers.					
6	Farmer-to-farmer learning is a major part of my farming routine.					

Others specify: _____
_____

_____

SECTION C: Motivations Influencing Participation in Knowledge Transfer

Which of the following influence your knowledge transfer among farmers

S/N	Motivation Statement	SA	A	N	D	SD
1	I participate because I enjoy helping other farmers grow.					
2	Participation improves my reputation among fellow farmers.					
3	I learn new ideas from interactions during knowledge sharing.					
4	Participation gives me access to farm inputs or group incentives.					
5	I am motivated by the support and recognition from local farmer groups.					
6	Knowledge sharing enhances my farm productivity.					

Others specify: _____

_____

_____

SECTION D: KNOWLEDGE TRANSFER AMONG FARMERS

Which of these catfish production practices have you received from fellow farmers

Knowledge	Received	Not received
Pond construction		
Liming pond water treatment		
Pond water treatment		
Pond fertilization		
Pond maintenance		
Stocking density		
Feeding		
Feed formulation		
Drug administration		
Harvesting		
Fish processing		
Marketing		
Preservation		
Record keeping		

Others specify: _____

_____

SECTION E: Constraints to Participation in Farmer-to-Farmer Knowledge Transfer

Which of these constraints affect your participation in knowledge transfer

S/N	Constraint Statement	SA	A	N	D	SD
1	I lack time to participate in farmer-to-farmer knowledge sharing.					
2	There is no organized platform for aquaculture knowledge exchange in my area.					
3	Language barriers or communication issues affect my participation.					
4	I do not trust the quality of information from fellow farmers.					
5	Distance to training locations or meetings is a challenge.					
6	I have no formal training on how to share knowledge effectively.					

Others specify: _____

_____

_____