EFFECTS OF EXTENSION SERVICE DELIVERY ON INCOME AMONG CATFISH PROCESSORS IN IKORODU LOCAL GOVERNMENT AREA OF LAGOS 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)

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CERTIFICATION

This is to certify that this research work on, "Effects 0f Extension Service Delivery On income Among Catfish Processors In Ikorodu Lacal Government Area Lagos State, Nigeria" was carried out by **Chijioke joackin ASONYE** with Matriculation Number AGR2008788 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.

To my parents and sibling whose love, unwavering support, prayers and encouragement have been a constant source of inspiration throughout this journey and finally to my friends, for their love and friendship I enjoyed all through

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ABSTRACT

Catfish processing is an important household income activity in many Nigerian communities, providing income, food security, and employment for women and low income households. Despite its growing relevance, the sub sector remains largely informal and under supported, particularly in semi urban areas such as Ikorodu LGA of Lagos State. Hence this study was conducted to assess how extension services influence income among catfish processors and examined the challenges affecting service delivery and utilisation. The study specifically aimed to: describe the socioeconomic characteristics of catfish processors in Ikorodu LGA; assess the current state of extension service delivery to catfish processors; evaluate the effects of extension services on income; and identify the challenges faced by catfish processors in accessing and utilising extension services.

A two stage sampling technique was used to select 120 catfish processors from five communities in Ikorodu LGA. Primary data were collected using a structured questionnaire. Descriptive statistics (frequencies, percentages, and means) were used to address Objectives 1–4, while multiple regression analysis examined the hypothesis regarding the relationship between socioeconomic characteristics and the effects of extension services on income. A 5 point Likert scale rating was used to interpret respondents' ratings of service delivery, benefits, and challenges.

Findings showed that both males and females were involved in catfish processing women, with varying levels of education, income, and years of experience. The assessment of extension service delivery produced mean scores slightly above 3.0, indicating moderate but inconsistent access to services. The perceived benefits of extension services on income were positive but not strongly pronounced. Major challenges identified included irregular visits from extension agents (mean = 3.59), long distance to service centres (mean = 3.64), and limited follow up support (mean = 3.66). Regression analysis revealed education level ($t = 2.824$; $p = 0.005$)., a significant relationship on the benefits derived from extension services. It was concluded that extension services contribute to improved knowledge and practices among catfish processors. The study recommends Extension training programmes should be design considering farmers level of education.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The African catfish (*Clarias gariepinus*) plays a crucial role in Nigeria's aquaculture sector. This species is known for its rapid growth, resilience to varying water conditions, and adaptability to high density culture systems (FAO, 2021). As the most commercially significant freshwater fish in the region, *Clarias gariepinus* is a dominant species in fish farming practices across Nigeria. Currently, Nigeria is the largest global producer of African catfish, with annual production estimated between 1 and 1.26 million tonnes. This sector supports approximately 2.5 million subsistence farmers and generates over one million jobs (FAO, 2021).

Given the dominance of *Clarias gariepinus* in Nigeria's aquaculture, the role of catfish processors becomes equally critical. After harvesting, the value addition chain is largely driven by small scale processors many of whom are rural women who transform fresh catfish into smoked, dried, or frozen products suitable for both domestic consumption and export (Adeoye & Afolabi, 2020). These processing activities not only extend the shelf life of catfish but also significantly increase its market value, thereby offering an important pathway for income generation in rural communities (Ibrahim *et al*., 2021).

Catfish farming and processing have emerged as significant sources of employment and income in Nigeria, especially among women and low income

households (FAO, 2021). However, while fish farming has received considerable attention, the processing sector which adds value to harvested catfish holds untapped potential for lifting people out of poverty. Catfish processing, often carried out by women and low income households, transforms fresh fish into smoked, dried, or packaged products, significantly enhancing market value and shelf life. Despite its importance, this sector remains underdeveloped due to limited access to modern equipment, lack of technical skills, and poor market information (Adeoye & Afolabi, 2020). This is where extension services become essential. According to the FAO (2000), extension refers to systems that help farmers, organizations, and other market actors access knowledge, information, and technologies; connect with partners in research, education, agribusiness, and other relevant institutions; and develop their technical, organizational, and management skills. By providing practical training, technical assistance, and access to improved technologies such as modern smoking kilns, extension agents enable processors to enhance product quality, improve hygiene standards, and reduce post harvest losses. (Ibrahim *et al*., 2021).

Furthermore, extension services often link processors to cooperatives, credit facilities, and market networks, increasing their economic resilience and boosting household incomes (Akinboye *et al*., 2024). When properly implemented, these

services can transform small scale processing from a subsistence activity into a viable business model, directly contributing to improve income (Oke *et al*., 2023; Ashley Dejo *et al*., 2022).

1.2 Problem Statement

Nigeria's aquaculture sector has grown rapidly in the last two decades, with catfish (*Clarias gariepinus*) dominating both production and consumption. As fish farming continues to expand, the processing sector which includes smoking, drying, and packaging plays a vital role in reducing post harvest losses, enhancing product value, and generating income for thousands of households. In semi urban and rural areas like Ikorodu LGA of Lagos State, catfish processing has become an essential income activity, especially for women and low income families. Despite its economic potential, this sub sector remains largely informal and under supported, making it difficult for processors to escape poverty cycles (Adeoye & Afolabi, 2020; Ibrahim *et al*., 2021).

Agricultural extension services are designed to bridge knowledge and resource gaps by offering technical support, modern equipment training, and business advisory services to rural producers and processors. These services have been shown to increase productivity and profitability in other areas of agriculture, including crop and livestock farming (Akinboye *et al*., 2024). However, in Ikorodu LGA, there is limited empirical evidence on how well extension services are reaching catfish processors, the quality of support provided, and whether such interventions are making any measurable effect on income among these actors. It is unclear whether processors are accessing these services

regularly, and if they are, whether the knowledge gained is being applied in ways that improve income.

This gap in knowledge presents a pressing development challenge. Without clear insights into how extension services affect income among catfish processors, policies and programs may fail to target the right needs, leaving a critical group behind. There is, therefore, a need to systematically assess the effects of extension services on income among catfish processors in Ikorodu LGA. Understanding this relationship will not only help in strengthening aquaculture value chains but will also inform evidence based policy interventions aimed at inclusive rural development and economic empowerment (Oke *et al*., 2023; Ashley Dejo *et al*., 2022).

1.3 Objectives of the Study

The main objective of this study is to assess the effects of extension services on income among catfish processors in Ikorodu LGA, Lagos State.

The specific objectives are to:

1. describe the socio economic characteristics of catfish processors in the study area;
2. assess the current state of extension service delivery to catfish processors in the study area;
3. estimate the perceived benefits of extension services on the income of catfish processors;
4. identify the challenges faced by catfish processors in accessing and utilizing extension services.

1.4 Justification of the Study

Although catfish processing has great potential to improve household income, many people involved in the sector continue to face serious challenges. These include limited access to modern tools, a lack of technical skills, poor connections to markets, and minimal institutional support. Agricultural extension services can play a key role in overcoming these issues by providing training, introducing better equipment, sharing market information, and helping processors access financial resources. However, in communities like Ikorodu, there is still very little information on how widely these services are being used or how effective they have been in improving the lives of catfish processors.

This study is important for several reasons. First, it fills a key gap in understanding how extension services reach and impact catfish processors, who are often overlooked but play an important role in the aquaculture value chain. Second, it provides useful evidence to guide policy and help direct resources toward rural development efforts that include all stakeholders.

The findings from this research will help improve how extension programs are designed and carried out so they better meet the needs of catfish processors. By strengthening this part of the aquaculture value chain, the study will contributes to improving food security, supporting rural economies, and empowering communities in Nigeria.

Lastly, by examining the relationship between extension services and income, this study contributes to the broader discourse on sustainable development and food security in Nigeria. Recent studies have highlighted the positive impact of extension services on income among fish farmers. For example, Oladele and Akinwale (2021) demonstrated that agricultural extension services significantly impact income among fish farmers in Ondo State, showing a strong positive relationship between income and extension service utilization. Similarly, Okoye *et al*. (2020) and Nwosu and Eze (2019) found that aquaculture farming supported by extension services played a crucial role in improving income in Ogun and Anambra States, respectively.

1.5 Hypotheses of the Study

1. There is no significant relationship between respondents' socioeconomic characteristics and the effects of extension services on their income in the study area.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Extension Services

Agricultural extension refers to a system of non formal education, information dissemination, and facilitation activities designed to improve the knowledge, skills, and practices of individuals engaged in agricultural production, processing, and marketing. According to the Food and Agriculture Organization (FAO, 2021), extension is the process of enabling farmers and processors to make informed decisions to increase productivity, income, and sustainability through the dissemination of innovations and research based knowledge. Extension services thus act as an essential link between research institutions and end users, ensuring that scientific findings are translated into actionable solutions within local contexts. Rivera and Qamar (2019) further emphasize that extension is not merely about technology transfer but also about capacity building, empowerment, and participatory learning core elements needed to enhance livelihood outcomes and improve income, particularly among rural populations dependent on agriculture and allied activities.

The primary objectives of agricultural extension services are to promote the adoption of improved technologies, increase production efficiency, and facilitate rural development through the empowerment of farming and processing communities. Anderson and Feder

(2020) assert that extension's objectives encompass increasing awareness of improved techniques, promoting sustainable natural resource management, and strengthening farmers' organizational capacities to enhance market participation. In aquaculture and fish processing systems, extension objectives include improving pond management, feed utilization, post harvest handling, and hygienic processing practices to reduce losses and ensure product quality (WorldFish, 2022). By focusing on such outcomes, extension services contribute not only to food security but also to improve income and gender inclusiveness in rural economies (Davis *et al*., 2021).

Extension service modalities have evolved significantly over the years, shifting from top down, government led technology transfer models to pluralistic and participatory systems that involve multiple actors. Traditional public sector extension—often criticized for inefficiency and limited reach—has increasingly been complemented by private sector initiatives, non governmental organizations (NGOs), and donor funded projects (Ainembabazi *et al*., 2020). In Nigeria, for example, the Agricultural Development Programme (ADP) structure has served as the backbone of public extension, while newer partnerships such as the Agricultural Transformation Agenda Support Programme (ATASP) integrate public, private, and community level participation (Ogunlade *et al*., 2021). These collaborative arrangements ensure that processors, including catfish processors, have access to timely technical advice, improved inputs, and financial linkages essential for enterprise growth and livelihood enhancement.

Contemporary extension approaches emphasize participatory and inclusive methodologies, including Farmer Field Schools (FFS), processors' cooperatives, and value chain platforms that foster collective learning and problem solving. Birner *et al*. (2021) note that modern extension goes beyond individual farmer training to encompass group based learning where participants engage in experiential problem solving and share indigenous knowledge. In aquaculture and fish processing, this participatory model promotes peer learning on improved smoking technologies, quality assurance, and safe fish handling practices that meet export and domestic market standards (Ekunwe & Emokaro, 2020). Extension activities increasingly employ information and communication technologies (ICTs)—such as mobile applications, social media platforms, and radio programs—to reach wider audiences efficiently and provide real time market and weather information (Aker *et al*., 2021).

Furthermore, the integration of digital and climate smart innovations into extension services marks a major shift toward sustainability and resilience. Digital extension systems enable remote advisory services, market linkages, and monitoring through platforms such as e extension, WhatsApp advisory groups, and the FAO Digital Services Portfolio (FAO, 2023). These modalities are particularly valuable to smallholder fish processors, who often face constraints in mobility, market access, and information availability. According to Kiptot and Franzel (2022), leveraging ICT in extension improves inclusion, particularly for women and youth, by lowering information barriers

and reducing transaction costs. Consequently, effective extension service delivery—whether through public, private, or digital means—plays a crucial role in enhancing the efficiency, income, and resilience of catfish processors, thereby contributing significantly to improve income and rural development in Nigeria.

2.2 Catfish Processing

Catfish (*Clarias gariepinus* and *Heterobranchus spp.*) remains a cornerstone of Nigeria's aquaculture industry, contributing significantly to household nutrition, employment, and income generation across rural and peri urban communities (Adewumi & Olaleye, 2020; FAO, 2022). Nigeria is the largest producer of catfish in sub Saharan Africa, accounting for over 60% of aquaculture output, and catfish processing constitutes an essential segment of this value chain (Oladimeji *et al*., 2021). Processing activities such as smoking, drying, salting, and packaging play a vital role in reducing perishability, improving shelf life, and enhancing the economic value of fish products (Olaoye *et al*., 2020). Women dominate post harvest catfish processing, particularly in small scale enterprises, where fish processing serves as both a livelihood strategy and increasing income (Ekunwe & Emokaro, 2020). As such, the efficiency of catfish processing directly influences rural income, employment generation, and food and nutritional security in Nigeria's aquaculture sector.

Within the aquaculture value chain, catfish processors serve as a critical link connecting producers to markets, determining both the economic returns and product quality available to consumers. According to the Food and Agriculture Organization (FAO, 2022), efficient processing and storage practices can reduce post harvest losses by up to 30%, thereby significantly enhancing value retention within local economies. However, traditional processing methods, such as open fire smoking, are energy inefficient and often compromise product quality and safety (WorldFish, 2021). The introduction of improved smoking kilns—such as the FAO Thiaroye Processing Technique (FTT)—has been shown to enhance fuel efficiency, reduce smoke contamination, and increase profit margins among small scale fish processors (Fawole *et al*., 2020). Moreover, adopting improved packaging and cold chain technologies facilitates access to premium markets, contributing to increased income and livelihood sustainability for processors and their households (Adebayo *et al*., 2023). Thus, catfish processing represents a pivotal opportunity for both economic empowerment and post harvest value addition in Nigeria's fisheries sector.

Despite its economic potential, catfish processing in Nigeria is constrained by multiple structural and operational challenges. Major constraints include dependence on inefficient traditional kilns, limited access to improved processing technologies, inadequate cold storage infrastructure, and insufficient working capital (Ekwegh *et al*., 2022; Eyo & Ologbon, 2020). Many processors lack access to credit and modern packaging materials,

which limits their ability to meet evolving consumer standards and regulatory requirements for hygiene and quality (Olaoye *et al*., 2020). The absence of reliable power supply and high costs of energy further compound these difficulties, reducing profitability and competitiveness (Fapohunda & Ayoola, 2021). Moreover, weak linkages between processors and markets—particularly modern retail chains—restrict income potential and contribute to continued vulnerability among rural processors, many of whom are women with limited access to formal financial systems (Adeogun *et al*., 2021).

Another critical constraint relates to knowledge and skill gaps among processors, stemming from insufficient exposure to extension and training programs. According to the World Bank (2023), knowledge intensive value chain segments, such as fish processing, require continuous technical support on food safety, hygiene, and value addition practices. In Nigeria, extension services for aquaculture have traditionally focused on fish production, with limited emphasis on post harvest handling and processing (Akinbile *et al*., 2022). As a result, many processors continue to use traditional smoking methods that lead to product contamination, nutritional losses, and health risks (Ogunremi *et al*., 2020). Targeted extension programs that incorporate capacity building, technical training, and the dissemination of improved processing innovations have demonstrated measurable impacts on reducing post harvest losses and increasing incomes among fish processors (FAO, 2022; Davis *et al*., 2021). Hence,

strengthening extension linkages for post harvest operators is fundamental to achieving inclusive and sustainable income improvement within Nigeria's aquaculture sector.

Catfish processors, therefore, constitute a priority group for intervention within the aquaculture value chain, particularly in the context of income and food security strategies. Enhancing their access to appropriate technologies, market information, and extension support can lead to significant productivity and welfare gains. Studies have shown that integrating catfish processors into organized cooperatives, digital marketing platforms, and value chain financing mechanisms can expand market access, improve price negotiation power, and enhance livelihoods (Adewumi & Olaleye, 2020; Oluwatayo & Ojo, 2022). Extension led interventions focused on improved smoking technologies, quality assurance, and entrepreneurial training offer a practical pathway to increase income among processing households (WorldFish, 2021). Therefore, addressing the technological, financial, and institutional constraints of catfish processing is not only essential for reducing post harvest losses but also for promoting inclusive growth and resilience among Nigeria's rural and peri urban communities.

2.3 Theoretical Perspectives

Theoretical frameworks provide the analytical foundation for understanding how and why agricultural extension services contribute to increase income, particularly among catfish processors in Nigeria. These frameworks elucidate the mechanisms through which

knowledge transfer, skill development, and innovation diffusion translate into improved productivity, income, and livelihood outcomes. In this study, three theoretical perspectives Human Capital Theory, Diffusion of Innovations Theory, and the Sustainable Livelihoods Approach offer conceptual clarity on the relationship between extension interventions and improve income within the catfish processing subsector.

2.3.1 Human Capital Theory (Becker, 1964)

Human Capital Theory, developed by Becker (1964), posits that investments in education, training, and knowledge acquisition enhance individual productivity and, consequently, income potential. The theory assumes that labour is not homogenous but can be improved through deliberate investments in human capacity. Within the agricultural and fish processing context, this theory implies that processors who acquire technical and managerial competencies through extension programs can achieve higher productivity and better livelihood outcomes. Empirical evidence supports this view: training in improved processing technologies, quality control, and enterprise management significantly increases processors' efficiency, profitability, and market competitiveness (Ogbonna *et al*., 2021; Ezeano *et al*., 2020).

Extension services serve as a primary channel for human capital formation by facilitating experiential learning, technology demonstrations, and skill enhancement. For instance, catfish processors who receive training on modern smoking kilns, hygienic handling, and

value addition not only produce superior quality products but also access premium markets that offer higher returns (Adekoya *et al*., 2022). These improvements translate into increased household income, greater employment opportunities, and enhanced food security key indicators improve income. Furthermore, as human capital accumulation fosters self efficacy and entrepreneurship, processors become less dependent on exploitative market intermediaries and more capable of expanding their enterprises (Ibrahim *et al*., 2023).

However, the theory also recognizes disparities in access to education and training opportunities, which can perpetuate income inequalities. In many rural communities, women processors—who dominate fish processing—often have limited access to extension services, financial resources, and educational support (Ogunbameru & Idrisa, 2019). This suggests that equitable extension programming is essential for ensuring inclusive increase income outcomes. Thus, Human Capital Theory underscores the pivotal role of capacity building and knowledge diffusion as sustainable strategies for empowering rural processors and reducing poverty.

2.3.2 Diffusion of Innovations Theory (Rogers, 2003)

The Diffusion of Innovations Theory, advanced by Rogers (2003), explains how new technologies, practices, or ideas spread within a social system over time. According to this theory, adoption occurs through identifiable stages knowledge, persuasion, decision,

implementation, and confirmation and depends on factors such as relative advantage, compatibility, complexity, trialability, and observability. Extension services act as catalysts in this diffusion process by identifying appropriate innovations (e.g., improved fish smoking kilns, better packaging materials), demonstrating their benefits, and promoting adoption among processors.

In the catfish processing value chain, diffusion dynamics are shaped by social structures, communication networks, and trust. Processors often rely on peer learning, group demonstrations, and farmer field schools to evaluate new technologies before adoption. Studies have shown that social learning and participatory extension approaches significantly enhance technology diffusion and sustained adoption rates in aquaculture value chains (Abdul Rahman *et al*., 2021; Olayemi & Yusuf, 2022). For example, when processors observe tangible benefits—such as reduced smoke emissions, improved product quality, and higher profit margins—they are more likely to adopt innovations.

The theory also categorizes adopters into innovators, early adopters, early majority, late majority, and laggards highlighting heterogeneity in adoption behaviour (Rogers, 2003). Extension officers can leverage this understanding to design tailored interventions, using opinion leaders and local champions to accelerate diffusion. In the Nigerian context, where literacy levels and resource constraints vary widely, combining interpersonal communication with ICT based dissemination tools such as WhatsApp groups and radio

programs can bridge information gaps and enhance adoption efficiency (Okorie *et al*., 2020).

Ultimately, the Diffusion of Innovations Theory underscores that the success of extension interventions depends not only on the technological merit of innovations but also on effective communication, trust building, and contextual adaptation. By applying these principles, extension services can facilitate the spread of improved fish processing technologies that enhance productivity, income, and resilience among catfish processors.

2.4 Sustainable Livelihoods Framework (SLF) and Empowerment Approaches

The Sustainable Livelihoods Framework (SLF) offers a holistic perspective for understanding how individuals and households utilize available resources and capabilities to achieve sustainable well being outcomes (Chambers & Conway, 1992). It identifies five core livelihood assets human, social, natural, physical, and financial capital—whose combination determines the capacity of rural households to sustain and improve their livelihoods. In the context of catfish processing, these assets interact to influence productivity, resilience, and poverty status. For instance, human capital encompasses the knowledge and skills processors gain through extension training; social capital includes networks and group affiliations that enable information sharing; physical capital represents infrastructure such as improved smoking kilns and storage facilities; financial capital covers access to savings and microcredit; and natural capital relates to water

quality and availability. Extension services directly affect most of these capitals, thereby enabling processors to manage shocks, enhance productivity, and increase incomes sustainably (DFID, 1999; Scoones, 2015).

By strengthening human capital, extension services enhance technical proficiency in modern processing methods and hygiene practices, reducing post harvest losses and improving product quality. These knowledge based interventions empower processors to adopt value adding technologies that increase market competitiveness. Similarly, when processors engage in collective learning and cooperative groups facilitated by extension agents, social capital expands improving trust, collaboration, and access to input suppliers or buyers. This collective agency is particularly crucial in the fish processing sector, where group marketing and bulk purchasing reduce transaction costs and improve bargaining power (Adewuyi & Ajibefun, 2021). Additionally, physical capital is enhanced when extension programs introduce or promote the use of efficient smoking kilns, improved packaging, or cold chain systems, which collectively improve product shelf life and income stability (Adekoya *et al*., 2022).

Extension also contributes indirectly to financial capital by facilitating linkages to microfinance institutions, savings cooperatives, and government empowerment schemes that support women and youth entrepreneurs. Many processors, particularly women, face challenges accessing credit due to limited collateral and lack of formal education. Extension facilitated financial inclusion mitigates these barriers and enables processors to

invest in improved technologies and business expansion (Ibrahim *et al*., 2023). Beyond material gains, extension programs often strengthen social and institutional linkages, connecting processors to government agencies, NGOs, and market intermediaries that provide ongoing support and advocacy. These linkages enhance processors' resilience against market shocks and promote long term livelihood sustainability.

Complementing SLF, empowerment approaches emphasize autonomy, participation, and control over productive resources particularly among marginalized groups such as women processors. Empowerment theory argues that poverty reduction transcends income generation; it also involves enhancing individuals' decision making capacity, agency, and voice within socio economic systems (Kabeer, 1999). For female catfish processors, empowerment through extension means improved negotiation power in markets, increased confidence to adopt innovations, and participation in leadership roles within cooperative associations. Empowered processors are better positioned to demand fair prices, access financial services, and influence value chain governance—outcomes that directly contribute to social inclusion and equitable poverty reduction (Ogunbameru & Idrisa, 2019).

Overall, the integration of the Sustainable Livelihoods Framework and empowerment approaches provides a multidimensional understanding of how extension services can catalyse poverty reduction among catfish processors. Rather than focusing solely on productivity gains, these frameworks underscore the broader pathways through which

extension fosters resilience, equity, and agency. By enhancing multiple forms of capital and empowering marginalized actors, extension services not only improve incomes but also transform the socio economic structures that perpetuate vulnerability. Thus, sustainable poverty reduction requires both capacity enhancement and empowerment oriented extension strategies tailored to the realities of rural fish processors.

2.5 Extension Services, Technology Adoption, and Processors' Performance

2.6.1 How Extension Drives Adoption of Processing Technologies

Extension services play a crucial role in promoting the adoption of improved processing technologies among catfish processors by serving as conduits for information, innovation, and behavioral change. Through structured training programs, demonstrations, and experiential learning, extension workers expose processors to alternatives to traditional methods such as open fire smoking and rudimentary packaging. Improved technologies—such as the FAO Thiaroye Fish Processing Technique (FTT) kiln have been widely promoted to enhance product quality, reduce post harvest losses, and minimize health hazards associated with smoke inhalation (Adekoya *et al*., 2022). Practical demonstrations and participatory approaches, including farmer field schools and processors' associations, are particularly effective because they combine visual learning with group problem solving, which enhances confidence and adoption rates (Ibrahim *et al*., 2023). Digital extension innovations such as mobile based advisories and WhatsApp based peer learning groups have recently complemented face to face approaches,

providing processors with real time guidance on market prices, hygiene protocols, and equipment maintenance (Adegbite *et al*., 2021). However, adoption success also depends on complementary access to finance, inputs, and enabling policies that support standardization and market recognition of improved products (Ogunbameru & Idrisa, 2019).

The degree to which processors adopt innovations is also influenced by socio economic characteristics such as education, gender, and access to credit. Women processors, who constitute a significant proportion of Nigeria's post harvest fish workforce, often face barriers related to affordability and limited financial literacy. Extension services that incorporate microcredit linkages or savings groups have been more effective in ensuring technology uptake (Adewuyi & Ajibefun, 2021). In contexts where literacy levels are low, extension agents use visual and demonstration methods rather than written materials, thus improving comprehension and retention. The adoption process is further strengthened when processors witness visible improvements in efficiency, output quality, or profitability, aligning with the "observability" principle of Rogers' Diffusion of Innovation theory. Therefore, technology adoption is a multidimensional process influenced by information dissemination, financial accessibility, social networks, and institutional support.

2.5.2 Evidence on Reductions in Post Harvest Losses and Quality Improvements

Post harvest losses in Nigeria's fish sector remain a major constraint to food security and income generation. Studies estimate that 20–25% of fish output is lost between harvest and consumption due to inadequate processing, preservation, and transportation infrastructure (FAO, 2021). The introduction of improved smoking kilns, such as the Chorkor and FTT Thiaroye models, has significantly reduced losses by ensuring even drying, reducing smoke contamination, and extending product shelf life (Adekoya *et al*., 2022). Extension led interventions that combine training on improved technologies with hygiene and packaging education have shown measurable impacts on reducing spoilage and improving market acceptance. For example, processors trained through the Agricultural Development Programme (ADP) in southern Nigeria recorded an average 30% reduction in post harvest losses and 20% increase in product quality scores (Eyo *et al*., 2020).

Improved quality also has implications for food safety and market competitiveness. Training in proper handling, sanitation, and grading enhances consumer trust and compliance with food safety standards, particularly in urban and export markets. Processors adopting improved kilns have reported reductions in fuelwood consumption and health risks associated with smoke exposure, underscoring both environmental and welfare benefits (Adewuyi & Ajibefun, 2021). In addition, processors equipped with packaging and labeling skills are better able to differentiate their products, enabling them to command premium prices in formal markets. Empirical evidence from pilot programs

in Nigeria's Niger Delta and Oyo State suggests that integrating technical innovations with business and market training yields the most sustainable improvements in post harvest outcomes (Alabi, 2024).

2.5.3 Extension's Role in Market Access and Value Capture

While technological upgrading is critical, extension services also play an instrumental role in improving market access and enabling processors to capture more value within the fish value chain. Market oriented extension approaches integrate processors into structured value chains by connecting them with aggregators, wholesalers, and institutional buyers. Such linkages reduce transaction costs, improve price transparency, and ensure stable demand for processed fish products (Ibrahim *et al*., 2023). Training in business management, product grading, and packaging standards further enhances processors' capacity to meet the quality requirements of high value markets. The Food and Agriculture Organization (FAO) and WorldFish have consistently emphasized that technical interventions must be complemented by market facilitation measures—such as collective marketing and certification—to ensure income growth translates into poverty reduction (WorldFish, 2023).

Moreover, extension services increasingly support processors in leveraging digital platforms for marketing and financial inclusion. Through mobile based applications and e commerce platforms, processors can now access buyers beyond local markets, negotiate better prices, and reduce dependence on intermediaries. This has been particularly

transformative for women and youth entrepreneurs who often face mobility and networking constraints. Extension agents also facilitate the formation of cooperative marketing associations, which pool resources, enable bulk sales, and enhance bargaining power (Adekoya *et al*., 2022). Such collective arrangements not only increase income but also foster social capital and resilience within processing communities.

Overall, extension services serve as a multidimensional driver of technological and market transformation for catfish processors in Nigeria. By integrating knowledge dissemination, technology adoption, and value chain facilitation, extension systems help reduce inefficiencies, minimize losses, and increase the profitability of small scale fish processing enterprises. When combined with access to finance, policy support, and infrastructure development, extension interventions can substantially enhance the livelihoods of rural processors and contribute to broader poverty reduction goals.

2.6 Empirical Evidence: Extension Services and Increase income

Empirical studies on the nexus between extension services and poverty reduction in the fisheries sector highlight the transformative potential of well structured interventions in enhancing livelihoods. In Nigeria, where aquaculture contributes significantly to food security and rural employment, catfish (*Clarias gariepinus*) remains the most dominant species in production and processing (FAO, 2022). Evidence suggests that improved access to extension services promotes adoption of modern processing techniques, increases product quality, and enhances market participation—factors that collectively

elevate household income and resilience. National aquaculture programmes supported by the Federal Department of Fisheries, FAO, and WorldFish have shown that integrating post harvest extension training with value chain development can significantly reduce poverty levels among small scale fish producers and processors (WorldFish, 2021).

At the macro and sectoral level, aquaculture led poverty reduction is increasingly recognised as a viable pathway for inclusive economic growth. Nigeria's aquaculture expansion, supported by international research collaborations, has yielded measurable welfare improvements, especially in rural and peri urban areas where smallholders dominate (Adewumi & Olaleye, 2019). Extension initiatives that combine capacity building, improved feed utilisation, and access to upgraded processing infrastructure have improved value retention across the catfish value chain. However, studies caution that poverty reducing outcomes are not uniformly distributed; access to markets, gender based constraints, and limited financial inclusion often mediate the degree to which extension benefits translate into sustainable income growth (WorldFish, 2020).

At the micro level, targeted interventions in fish processing demonstrate the tangible impacts of extension on household welfare. Studies assessing the adoption of improved smoking kilns (e.g., FAO Thiaroye technology) and hygienic processing practices report declines in post harvest losses of up to 20%, with corresponding increases in product shelf life and income margins (Okonta *et al*., 2020; Yusuf *et al*., 2021). Training programmes that combine technical skills with entrepreneurial and market linkage

components yield better results than stand alone technical interventions. Digital extension platforms, piloted in states such as Lagos and Ogun, have also enhanced information dissemination, though their effectiveness remains limited by literacy levels and digital access among rural processors (Ezeh & Anyanwu, 2022).

For catfish processors specifically, the empirical base is still developing but indicative of positive trends. Studies in Oyo and Kwara States reveal that most processors rely on traditional smoking methods, which result in quality inconsistencies and market rejection (Adewumi & Olaleye, 2019). Where processors have received targeted extension support, including demonstrations of improved kilns and packaging techniques, both productivity and profitability have improved (Olagunju *et al*., 2020). Regional evaluations, such as those presented at the Tropentag Conference, further recommend strengthening extension programmes to address gender disparities and capital constraints that hinder adoption of improved technologies (Tropentag, 2023).

Overall, empirical evidence underscores that extension services play a pivotal role in strengthening the adaptive and productive capacities of catfish processors. When appropriately designed, these services not only enhance technical competencies but also facilitate access to markets and finance, ultimately leading to poverty reduction. Yet, the sustainability of these impacts hinges on complementary factors such as institutional support, inclusive financing mechanisms, and policies that recognise the unique role of

small scale fish processors—particularly women—in the aquaculture value chain (FAO, 2022; WorldFish, 2021).

2.7 Gender Dynamics: Women Processors and Access to Extension

Women constitute the majority of small scale fish processors in Nigeria, playing critical roles in smoking, drying, and marketing catfish and other species within rural and peri urban value chains (FAO, 2022). Their participation in post harvest activities contributes significantly to household food security and income diversification. However, structural gender disparities—rooted in sociocultural norms and unequal access to productive resources—limit women's capacity to fully benefit from agricultural extension services (Olagunju *et al*., 2020). Women processors often operate within informal settings, balancing household responsibilities with income generating activities, which restricts their mobility and availability to attend conventional extension programmes typically designed for men. As a result, they face barriers in adopting improved processing technologies, reducing post harvest losses, and accessing higher value markets.

Empirical research indicates that gendered access to extension services remains a persistent challenge across Nigeria's aquaculture sector. Studies show that women processors are less likely to be reached by formal extension agents or to receive timely information about improved technologies and market opportunities (Adewumi & Olaleye, 2019). This exclusion is often reinforced by extension delivery models that fail to consider gender specific time constraints, literacy levels, and social dynamics. For

instance, training sessions scheduled during peak domestic hours or at distant locations tend to discourage women's participation. Consequently, interventions that lack gender sensitivity risk perpetuating inequality, as men—who are more mobile and asset endowed—capture most of the benefits from innovations introduced by extension systems (Ezeh & Anyanwu, 2022).

Gender responsive extension approaches, however, have demonstrated considerable potential in addressing these inequities. When extension services are delivered through women's groups, cooperatives, or savings associations, participation and adoption rates among women processors increase substantially (WorldFish, 2021). Group based learning not only improves technical competencies but also enhances women's bargaining power, social capital, and access to microfinance. Training designed around flexible schedules and community based venues has proven more inclusive and effective, as seen in pilot programmes implemented in Oyo and Kwara States that combined technical instruction with leadership and financial literacy training (Yusuf *et al*., 2021). Such interventions underscore the importance of integrating gender considerations into all stages of extension planning and delivery.

Recent studies emphasise that gender sensitive extension should go beyond access to information to address broader structural constraints. These include limited control over income, inadequate access to credit for equipment upgrades, and exclusion from decision making processes within cooperatives or market associations (Okonta *et al*., 2020).

Incorporating empowerment frameworks into extension—such as supporting women led processing enterprises, improving childcare arrangements during training, and subsidising group membership fees—enhances both participation and economic outcomes. Empowered women processors not only improve their livelihoods but also contribute to community level poverty reduction by creating employment and promoting food security.

In sum, the integration of gender equity into extension design is central to achieving inclusive development outcomes in Nigeria's fish processing sector. Women's dominance in processing positions them as key agents of change within the value chain, yet their potential remains underutilised due to systemic barriers. Gender responsive extension, therefore, should be viewed not merely as a social inclusion strategy but as a pragmatic pathway to enhancing productivity, reducing poverty, and strengthening the resilience of rural livelihoods. By tailoring extension interventions to women's realities and empowering them as leaders and innovators, development programmes can ensure that aquaculture growth translates into equitable and sustainable benefits across genders (FAO, 2022; WorldFish, 2021).

2.8 Constraints to Effective Extension Delivery for Processors

Public agricultural extension systems in Nigeria and across sub Saharan Africa continue to face significant institutional and resource related challenges that limit their capacity to effectively serve fish processors. Historically, government extension has been oriented toward primary producers, with limited attention to post harvest and processing actors

within the value chain (Adeleke & Nwokoro, 2020). Many state level extension services operate under severe financial constraints, resulting in inadequate logistics, poor remuneration, and insufficient training opportunities for extension personnel. These systemic challenges contribute to low field presence and poor coverage, particularly for women processors operating in rural or peri urban locations. The result is a weak linkage between research outputs, technological innovations, and the actual needs of fish processors, who remain excluded from mainstream extension benefits (Ogunyemi *et al*., 2021).

Staffing shortages remain a major barrier to efficient extension delivery. In several states, the ratio of extension agents to clients far exceeds the recommended benchmark of 1:800, with some areas reporting ratios as high as 1:5000, severely constraining outreach effectiveness (Ezeh & Anyanwu, 2022). In addition, many agents lack specific training in fish processing or post harvest management, leading to generic and often irrelevant advisory content. Limited funding for operational logistics—such as transportation, demonstration materials, and monitoring—further restricts their ability to provide hands on technical support. Consequently, extension visits are infrequent and concentrated around donor funded projects rather than sustained government led programmes, undermining long term impact and continuity (Okonkwo *et al*., 2020).

Where public sector capacity is weak, non governmental organisations (NGOs), private agribusinesses, and donor funded initiatives often attempt to fill the gap. While these

efforts can provide critical short term support, they are frequently constrained by project based funding cycles and limited geographic scope (Adewumi & Olaleye, 2019). Many of these interventions focus on demonstration activities during active project phases, with limited follow up or institutional integration after project completion. The lack of coordination between actors—government agencies, research institutions, standards bodies, and market facilitators—further exacerbates inefficiencies. This fragmentation results in duplication of efforts, inconsistent training curricula, and gaps in the dissemination of technical knowledge relevant to fish processing and quality assurance (Olagunju *et al*., 2020).

Another major institutional constraint lies in the absence of well tailored training materials that reflect the literacy levels, gender dynamics, and economic realities of processors. Many existing manuals and training modules are designed for commercial scale producers, often relying on technical jargon that is inaccessible to small scale or semi literate processors (WorldFish, 2021). Furthermore, training sessions are frequently delivered in English rather than local languages, reducing comprehension and adoption rates. The absence of visual or demonstration based approaches further limits effectiveness, as many processors benefit more from practical, experience based learning. Without adequate adaptation of extension content, training efforts risk being superficial, with limited translation into improved practices or sustained behavioural change (FAO, 2022).

2.8.1 Finance, Inputs, and Market Constraints

A major barrier to translating extension training into tangible poverty reduction outcomes among catfish processors lies in the limited access to financial resources and essential production inputs. Many small scale processors in Nigeria operate within informal and resource constrained settings, with little or no access to affordable credit or microfinance services (Ogunyemi *et al*., 2021). This financial exclusion limits their ability to acquire improved processing technologies such as modern smoking kilns, hygienic packaging materials, and cold storage equipment that are critical for quality improvement and post harvest loss reduction. Even when processors receive technical training through extension programmes, the inability to invest in necessary equipment often prevents them from applying newly acquired knowledge, leading to minimal productivity or income gains (Adewumi & Olaleye, 2019).

Furthermore, the high cost and limited availability of key inputs present substantial challenges to the adoption of improved technologies. Many of the recommended inputs—such as fuel efficient smoking kilns, stainless steel processing tables, and composite packaging materials—are either imported or produced at limited scale, making them expensive and inaccessible to low income processors (Olagunju *et al*., 2020). The absence of coordinated supply chains for these inputs often results in irregular availability and price fluctuations that discourage adoption. Some processors continue to rely on inefficient traditional methods because they are cheaper and locally accessible, even

though they compromise product quality and market competitiveness. Without supportive mechanisms—such as input subsidies, cooperatives, or revolving funds processors remain trapped in low investment, low return cycles that perpetuate poverty.

Access to reliable and remunerative markets is another crucial factor influencing the effectiveness of extension interventions. Even when processors adopt improved methods, market constraints often prevent them from realizing the full value of their investment. Weak linkages to aggregators, poor market information systems, and limited access to urban or institutional buyers restrict the ability of processors to sell at competitive prices (Okonkwo *et al*., 2020). Additionally, market entry barriers such as high transportation costs, limited infrastructure, and price volatility further erode potential income gains. The lack of structured markets or contractual arrangements between processors and buyers increases uncertainty and discourages investment in improved processing methods (Ezeh & Anyanwu, 2022).

Empirical studies increasingly advocate for "bundled" or integrated interventions that combine technical training with access to finance and market linkages to achieve measurable poverty reduction outcomes (WorldFish, 2021). For instance, processors who received not only training but also access to microcredit and linkage to consistent buyers were significantly more likely to adopt improved technologies and report higher incomes compared to those who received training alone. Such bundled approaches help mitigate risk, enhance adoption rates, and strengthen the capacity of processors to compete in

formal and semi formal markets. This approach aligns with evidence from other agricultural value chains, where integration of extension, finance, and marketing support has produced stronger and more sustainable welfare effects (FAO, 2022).

In summary, financial constraints, limited access to inputs, and weak market linkages collectively undermine the effectiveness of extension services in improving the welfare of catfish processors. For extension to deliver sustained poverty reduction outcomes, policy and programmatic strategies must go beyond knowledge dissemination to address structural barriers in finance and markets. Strengthening partnerships with microfinance institutions, developing inclusive value chains, and supporting input supply networks would enhance processors' ability to translate technical knowledge into income generating activities. A comprehensive and integrated extension model linking capacity building with access to credit, inputs, and stable markets remains essential for empowering Nigeria's catfish processors and achieving meaningful poverty reduction.

2.8.2 Socio Cultural and Capacity Limitations

Socio cultural factors and capacity limitations remain persistent barriers to the effective diffusion and adoption of improved fish processing technologies in Nigeria. Many processors, particularly in rural communities, have low levels of formal education and literacy, which limits their ability to understand written training materials or adopt complex processing techniques. This literacy gap often hinders their engagement with formal extension systems and participation in organized capacity building activities.

Studies indicate that a significant proportion of fish processors rely on indigenous knowledge passed down through generations rather than on formal training or scientific guidance (Ayanwale *et al*., 2020). Consequently, knowledge transfer becomes slow, and the willingness to adopt new methods such as improved smoking kilns, hygienic packaging, or cold storageis often constrained by limited comprehension and trust in external innovations.

Furthermore, entrenched gender norms significantly shape access to extension services and innovation uptake among women processors. Cultural expectations frequently assign domestic responsibilities and limit women's mobility, reducing their capacity to attend trainings or market meetings organized outside their immediate communities. As a result, women's participation in formal extension activities tends to be lower than that of men, despite their numerical dominance in small scale processing (Ebewore & Emokaro, 2021). The male dominated structure of most extension systems also perpetuates these inequalities, as male agents may be less effective at engaging female clients due to social and cultural barriers. In such contexts, women's voices and experiential knowledge remain underrepresented in programme design, leading to low relevance and poor adoption outcomes.

Resistance to change represents another significant socio cultural constraint. Many processors exhibit a strong preference for traditional methods such as open fire smoking because these practices are perceived as cheaper, easier, and culturally familiar. The

introduction of new technologies is often viewed with suspicion, especially when the benefits are not immediately visible or when the innovations appear to conflict with existing socio economic norms. Empirical findings suggest that behavioural inertia, coupled with risk aversion among rural processors, delays the uptake of innovations unless adequate sensitisation and demonstration activities accompany extension efforts (Olagunju *et al*., 2020). In such environments, the perceived cost and labour demands of adopting modern technologies outweigh the long term productivity or health benefits.

Addressing these socio cultural and capacity constraints requires context specific extension strategies that combine education, demonstration, and behavioural change communication. The diffusion of innovation theory underscores the role of opinion leaders and local champions in influencing peers to adopt new technologies (Rogers, 2003). Practical interventions—such as hands on demonstrations, peer learning groups, and participatory technology trials—can help processors observe tangible benefits before committing to change. Additionally, providing short, visually oriented training materials in local languages and integrating extension messages with existing social networks have been shown to improve adoption rates (Ibrahim *et al*., 2022).

Finally, overcoming socio cultural barriers also demands targeted incentives and inclusive programming. Subsidised access to improved kilns or credit facilities can reduce the perceived risk associated with innovation adoption. Collaborative approaches that involve community leaders, women's cooperatives, and faith based groups have been particularly

effective in mobilising participation and fostering trust between processors and extension agents. By aligning extension delivery with cultural realities and local learning patterns, development actors can enhance the relevance, inclusiveness, and sustainability of extension interventions among fish processors in Nigeria.

CHAPTER THREE

METHODOLOGY

3.1 Study Area and Scope of the Study

The study was conducted in Ikorodu Local Government Area of Lagos State. Lagos State is located in the southwestern region of Nigeria and is the nation's commercial and economic hub. It is the most populous state in Nigeria and includes Lagos city, one of the fastest growing urban centers in Africa. Bordered by the Atlantic Ocean, Lagos serves as a major port and gateway for international trade. The state is known for its vibrant culture, and significant contributions to Nigeria’s economy. Despite its rapid development, Lagos faces challenges such as traffic congestion, housing shortages, and environmental degradation.

Ikorodu Local Government Area (LGA) is one of the 20 LGAs in Lagos State, located in the northeastern part of the state. It lies approximately 36 kilometers north of Lagos Island and shares boundaries with Ogun State to the north and east, as well as other LGAs such as Kosofe and Ibeju Lekki. Some communities in the LGA are Ikorodu Central, Igbogbo, Ijede, Imota, Ipanmi, Agbaku, Ajebo, Ofin, Maya, Salabaw. The population is over 1 million, making it one of the largest cities in Lagos State. It celebrates traditional festivals like Eyo festival, and is known for its arts and crafts particularly pottery.

Additionally, it is home for Tourism due to it closeness to beaches like Tarkwa Bay beach and Lekki conservation center.

3.2 Sampling Procedures and Size

A two stage sampling technique was used for this study.

Stage 1: This involved the use of stratified random sampling procedures to select 5 communities in Ikorodu Local Government Area (Maya, Ijede, Imota, Agbaku, Ofin) based on notable aquaculture and fish processing activities from previous survey and to ensure better representativeness.

Stage 2: A simple random sampling was used to select 120 respondents based on estimated activities from the selected communities.

Table 1: Allocation Table for 120 Respondents

S/N	Community	Population size	Sample size
1	Imota	300	36
2	Ijede	250	30
3	Maya	200	24
4	Agbaku	150	18
5	Ofin	100	12
Total		**1000**	**120**

Formula to arrive at number of respondents:

Sample size = (Population Size/Total Size) ×120

3.3 Data Collection

The study used both primary and secondary. The primary data were collected from catfish processors with the help of a structured questionnaire while the secondary data were obtained from relevant literature, textbooks, agricultural journals, periodicals, bulletins and the internet.

3.4 Validation of Instrument

The questionnaire which was used for collection of data which were thoroughly scrutinized and validated by lecturers in the department of Agricultural Extension and Rural development to ensure accurate capture of required variables, as well as to prevent errors in the data collection process.

3.5 Measurements of Variables

a Socioeconomic Characteristics

1. **Age:** The age of the respondents was measured in years.
2. **Gender:** This was measured at nominal level using options of Male (1), and female (0)
3. **Marital Status:** This was measured at the nominal level using the options of Single (1), Married (2)**,** Divorced (3), Widowed (4), Separated (5).

4. **Educational Level:** Respondents were asked to indicate their level of education. This will be measured with the options of No formal education (1), Primary (2), Secondary (3), Tertiary (4), Vocational (5).
5. **Household Size:** Respondents were asked to indicate their household size using numerical values.
6. **Years of Experience in Processing:** Respondents were asked to indicate their years of experience using numerical value.
7. **Monthly Income from Processing:** Respondents were asked to indicate their income from the range, ₦0 – ₦20,000 (1), ₦20,001 – ₦50,000 (2), ₦50,001 – ₦100,000 (3), ₦50,001 – ₦100,000 (4).
8. **Access to Credit or Loans:** Respondents were asked if they have access to loan facilities, Yes (1), No (2).
9. **Membership in Association/Cooperatives:** Yes (1), No (2)
10. **Primary Market for Products:** Respondents were asked to indicate where they sell their products.

b. Assess the Current State of Extension service Delivery to Catfish Processors: This was measured using a 5 point Likert scale with the following ratings Excellent = 5, Good = 4, Fair = 3, Poor = 2, and Very Poor = 1. The benchmark mean score was 3.0. A mean score above 3.0 indicate a satisfactory or good state of extension service delivery, while a mean score below 3.0 suggested that the services are generally perceived as poor or unsatisfactory by the respondents

c. Evaluate the Effects of Extension Services on the Income of Catfish Processors: This was measured using a 5 point Likert rating scale, where Very Effective = 5, Effective = 4, Neutral = 3, Not Effective = 2, and Not at All Effective = 1. The benchmark mean score was 3.0. A mean score above 3.0 will indicate that the respondents perceive extension services to have a positive effect on their income, while a mean below 3.0 will indicate a negative perception of the effect.

d. Identify the Challenges Faced by Catfish Processors in Accessing and Utilizing Extension Services: A 5 point Likert scale was employed with the following ratings: Very Serious = 5, Serious = 4, Moderate = 3, Minor= 2, and Not a Challenge = 1. A benchmark mean score of 3.0 served as the neutral threshold. Mean scores above 3.0 indicated that respondents perceive the item as a significant challenge, while scores below 3.0 suggested that the issue is not widely experienced or considered problematic.

3.6 Analytical Techniques

Objective 1: The socioeconomic characteristics of the respondents were described using descriptive statistics such as frequency count, percentages.

Objective 2 to 4: These was analyzed using descriptive statistics such as frequency count, percentages.

3.7 Test of Hypothesis

There is no significant relationship between respondents' socioeconomic characteristics and the effects of extension services on their income in the study area. This was analyzed with the use of multiple regression model, specify thus

The multiple regression is implicitly given as:

$$Y = \beta_1 \times_1 + \beta_2 \times_2 + \beta_3 \times_3 + \beta_4 \times_4 + \beta_5 \times_5 + \beta_6 \times_6 + \times_n$$

Where:

Y = Effects of extension services on income

X_1= Age

X_2 = Experience in processing

X_3 = Primary Market

X_4 = Monthly income

X_5 = Level of education

X_6 = Membership in cooperatives.

CHAPTER FOUR

4.0 RESULTS AND DISCUSION

4.1 Socioeconomic characteristics

Table 4.1 shows an equal representation of men and women, with males (50%) and females (50%). This balance suggests that catfish processing in the area attracts both genders equally. Earlier studies have shown that fish processing is one of the value chain activities where both men and women participate actively because it provides steady income and can be combined with household responsibilities (FAO, 2014; Amienghene, 2015).

Majority of the respondents were married (81.7%), while single (9.9%), divorced (2.1%), and widowed (6.3%) respondents formed smaller proportions. The dominance of married respondents shows that catfish processing supports family wellbeing. This agrees with findings that rural agribusiness activities are mainly sustained by married adults who carry household financial responsibilities (Ayanwale and Alimi, 2014; Nwaobi, 2023).

About 32.4% were between 25–44 years, and a much larger 61.3% were between 45–64 years, while 6.3% were above 65 years. This can mean most of the processors are mature adults with long term experience in the enterprise. According to the Federal Office of Statistics (1996) and Dada (2024), fish processing in Nigeria is commonly dominated by middle aged individuals because the work requires skills that develop over time. This

agrees with findings of Mbam Halvorsen and Okoye (2022) who opined that young Nigerians are actively involved in agricultural activities.

Educational levels were relatively high. Only 6.3% fish processors respondents had primary education, 26.1% secondary, while a higher percentage of respondents 67.6%, had tertiary education. This high educational attainment is important because better educated processors are more likely to adopt improved processing techniques, maintain quality standards, and engage in wider markets (Anderson and Feder, 2023). It also reflects the growing shift of educated Nigerians into agro processing as a source of economic security (Adebayo and Okuneye, 2015).

Monthly income from catfish processing varied. About 26.1% earned below ₦50,000, 27.5% earned ₦50,000–₦100,000, 16.9% earned ₦100,001–₦150,000, while 29.6% earned above ₦150,000. The fact that nearly one third earn above ₦150,000 shows that catfish processing can be a profitable. Income diversity in fish processing is widely reported and depends on market access, processing scale, and customer demand (Delgado et al., 2013; Etim and Patrick, 2021).

Experience levels further support this. Only 21.1% had less than 5 years of experience, while 64.1% had between 5–14 years, and 14.8% had over 15 years of experience. This concentration of respondents with more than 5 years' experience demonstrates that catfish processing in the study area is well established and run by people who have mastered the

trade. Experience is a major factor in quality control, income stability, and market expansion in fish processing (FAO, 2011; Osunde, 2018).

Membership in cooperatives was extremely high, with 97.2% of fish processors belonging to an association. This is expected because processors often join cooperatives to access group markets, training, bulk inputs, and information (Christoplos, 2010). Strong group networks also reflect social capital, which is important for strengthening agribusiness performance (Percy and Tanko, 2023).

Despite this high cooperative membership, access to credit was low. Only 26.8% had access to loans, while 73.2% reported no access. This is consistent with long standing reports that financial institutions seldom support small scale processors due to collateral demands and perceived risks (World Bank, 2017; Ayanwale and Adisa, 2012). Limited access to credit remains a major constraint to growth in the fisheries value chain.

Marketing outlets used by the respondents show that catfish sales are distributed across multiple channels. Only 0.7% sold across all outlets or exported, 7% sold at the farm gate, 39.4% sold mainly in local markets, 15.5% through online platforms, 0.7% to restaurants, and 35.9% to wholesalers. The combination of local markets and wholesalers as the dominant outlets (together over 75%) shows that the business is still driven by traditional physical markets, although the 15.5% online sales indicate a gradual shift toward digital

marketing. This results agrees with findings of Adedigba, Jatto, Olaitan and Oke, (2024) who reported that majority of catfish marketers sold their fish in local market.

Table 4.1 Socio Economic Characteristics of the Respondent

		Freq	%
Sex	Male	71	50.0
	Female	71	50.0
Marital Status	Single	14	9.9
	Married	116	81.7
	Divorced	3	2.1
	Widowed	9	6.3
Age of respondents	< 25.0	0	.0
	25.0 44.0	46	32.4
	45.0 64.0	87	61.3
	65.0+	9	6.3
Educational Level	Primary	9	6.3
	Secondary	37	26.1
	Tertiary	96	67.6
	Vocational	0	.0
Monthly Income from Catfish Processing	Below 50,000	37	26.1
	50,000 100,000	39	27.5
	100,001 150,000	24	16.9
	Above 150,000	42	29.6
Experience in Catfish Processing (Years)	< 5.0	30	21.1
	5.0 14.0	91	64.1
	15.0+	21	14.8
Are you a member of any cooperative/association	Yes	138	97.2
	No	4	2.8
Do you have access to credit or loans for your business?	Yes	38	26.8
	No	104	73.2
Where do you mainly sell your processed catfish	All of the above	1	.7
	Export	1	.7
	Farm gate	10	7.0

Local market	56	39.4
Online	22	15.5
Restaurant	1	.7
Wholesaler	51	35.9

Source: Field survey, 2025

4.2 Assessment of Extension Service Delivery to Catfish Processors

Results in Table 4.2 presents respondents' assessment of extension service delivery in their communities. The results show that extension services are generally available, although not at an optimal level. The mean score for availability was ($\bar{x}$ 3.38, indicating that processors perceive extension services as moderately present in their area. This aligns with earlier reports that extension services in Nigeria exist in most farming communities but often lack full coverage and regular presence (Agbamu, 2015; Anderson, 2017).

The frequency of extension visits recorded ($\bar{x}$ = 3.11), suggesting that visits occur but not as regularly as required for a value chain like fish processing, which demands continuous technical guidance. Studies have shown that irregular contact with extension agents limits technology adoption and reduces the impact of extension activities (Anderson and Feder, 2023). Accessibility of extension officers, measured by respondents' ability to reach them when needed, ($\bar{x}$ = 3.30). This finding is consistent with the well known challenge of limited staffing and high coverage ratios faced by most extension agencies in Nigeria (Birner, 2016). Respondents rated the relevance of information provided during training

highly, ($\bar{x}$ = 3.76). This indicates that the content delivered by extension agents is meaningful and useful to processors. Literature has emphasized that relevant and context specific information is a crucial determinant of effective extension service delivery (Christoplos, 2021).

Communication skills of extension staff ($\bar{x}$ = 3.56). This reflects that extension agents are able to convey technical information in a manner processor can understand. Good communication is central to successful advisory services, as highlighted by Swanson, Samy and Sofranko (2023). In contrast, the timeliness of support was ($\bar{x}$ = 3.28). This suggests that although support is provided, it may not always come at the critical periods when processors need it most. Timeliness has been identified as one of the recurrent weaknesses of traditional extension systems in developing countries, often due to logistical and staffing constraints (Duraisumy, 2017; World Bank, 2017).

The extent to which extension services address specific processing needs ($\bar{x}$ = 3.19), pointing to a gap in adapting services to the unique challenges of catfish processing. This supports findings that extension delivery in Nigeria often focuses more on primary production than on post harvest activities such as processing and value addition (Fritschel, 2023). Coverage of processors in the area was rated 3.36, indicating average outreach. This reflects long standing concerns about limited extension manpower relative to the population of rural entrepreneurs (Adebayo and Okuneye, 2015).

Follow up support after training or field visits ($\bar{x}$ = 3.16), suggesting that after initial training or contact, continuous assistance is weak. According to Percy and Tanko (2023), sustained follow up is key to ensuring that farmers and processors internalize and apply recommended practices. Respondents rated the overall quality of extension service delivery at ($\bar{x}$ = 3.21) showing a moderate level of satisfaction. While the services available are useful, the results point to weaknesses in visit frequency, timeliness, follow up, and coverage areas consistently noted in earlier research on Nigeria's extension system (Anderson, 2017).

Table 4.2 Assessment of Extension Service Delivery to Catfish Processors

	Excellent		Fair		Good		Poor		Very Poor			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Mean	Std. Deviation
Availability of extension services in your area	10	7.0	50	35.2	62	43.7	12	8.5	8	5.6	3.380	.9433
Frequency of visits by extension agents	8	5.6	49	34.5	48	33.8	26	18.3	11	7.7	3.113	1.0252
How would you rate the accessibility of extension officers when needed	14	9.9	50	35.2	50	35.2	20	14.1	8	5.6	3.296	1.0161
How would you rate the relevance of information provided during training?	33	23.2	27	19.0	65	45.8	11	7.7	6	4.2	3.761	1.0309
How would you rate the communication skills of the extension agents?	17	12.0	28	19.7	75	52.8	14	9.9	8	5.6	3.556	1.0143
How would you rate the timeliness of the support you receive?	16	11.3	45	31.7	49	34.5	22	15.5	10	7.0	3.275	1.0794
How well do extension services address your specific processing needs?	9	6.3	54	38.0	49	34.5	20	14.1	10	7.0	3.190	.9960
How would you rate the coverage of catfish processors in your area?	11	7.7	52	36.6	58	40.8	13	9.2	8	5.6	3.359	.9553
How would you rate the follow up support after training or visits?	16	11.3	54	38.0	38	26.8	21	14.8	13	9.2	3.162	1.1021
How would you rate the quality of extension service delivery?	13	9.2	53	37.3	46	32.4	18	12.7	12	8.5	3.211	1.0574

Source: Field survey, 2025

4.3 Perceived Benefits of Extension Services on Income of catfish processors

Table 4.3 shows the perceived benefits farmers receive from extension services in terms of improving their income. Improvement in income ($\bar{x}$ = 3.16), suggesting that respondents feel extension services have helped their earnings, though not very strongly. This agrees with findings that extension support can raise income when processors adopt improved methods, but the impact is often limited by irregular visits and poor follow up (Swanson, 2024). Introducing new tools and innovations ($\bar{x}$ = 3.23), showing that processors recognize the role of extension in exposing them to better equipment and improved techniques. Studies have shown that innovation transfer is one of the strongest contributions of extension systems in developing countries (Christoplos, 2010; FAO, 2013), and this explains why respondents rated this aspect slightly higher.

The effectiveness of extension services in improving the quality of processed catfish ($\bar{x}$ = 3.14). This indicates a moderate influence, meaning processors feel the advice and training they receive helps them improve product quality, but the support may not be thorough enough. Similar observations were made by Torimiro (2016), who noted that extension services have potential to improve post harvest handling but often lack the continuity needed for stronger impact. Increasing confidence in business management ($\bar{x}$ = 3.13). This suggests that extension services give processors some level of assurance in running their enterprises. According to Percy and Tanko (2023), extension advisory

services can boost confidence by teaching better planning and decision making, which aligns with this finding.

Extension services helping to reduce post harvest losses had a mean of 3.02, one of the lower scores in the table. This shows that processors feel the support in this area is present but not very strong. The persistence of post harvest losses in fish processing has been highlighted in earlier studies, which noted that many extension agents focus more on production than processing (Fritschel, 2023; Osunde, 2018). The lowest mean score was recorded for improving access to better markets, at ($\bar{x}$ = 2.93). This indicates that respondents do not feel extension services have been very effective in linking them to good buyers or formal markets. This finding supports earlier reports that market linkage is one of the weakest aspects of Nigeria's extension system, despite its importance for income and livelihood strengthening (Duraisumy, 2017).

Table 4.3 Perceived benefits of extension services on the income of catfish processors

	Effective		Neutral		Not at all Effective		Not Effective		Very Effective			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Mean	SD
Improvement on your income from catfish processing	41	28.9	56	39.4	13	9.2	19	13.4	13	9.2	3.155	1.0672
Introducing new tools or innovations to you	41	28.9	50	35.2	17	12.0	14	9.9	20	14.1	3.232	1.1770
How effective have they been in improving the quality of your processed catfish?	43	30.3	53	37.3	19	13.4	13	9.2	14	9.9	3.141	1.1460
To what extent have extension services increased your confidence in managing your business?	44	31.0	47	33.1	22	15.5	13	9.2	16	11.3	3.134	1.2101
How effective are the extension services in helping you reduce post harvest losses in catfish processing	40	28.2	51	35.9	22	15.5	17	12.0	12	8.5	3.021	1.1698
How effective have they been in improving your access to better markets or buyers?	34	23.9	51	35.9	26	18.3	18	12.7	13	9.2	2.930	1.2125

Source: Field survey, 2025

4.4 Challenges Faced by Catfish Processors in Accessing and Utilizing Extension Services

As shown in Table 4.4. Irregular visits by extension agents ($\bar{x}$ = 3.59**)**, shows that inconsistent contact with extension officers is a major challenge for processors. This finding aligns with previous studies which highlight that irregularity in extension visits limits farmers' ability to adopt innovations and gain timely support (Anderson and Feder, 2023). Frequent interactions with extension agents are critical for skill acquisition and problem solving in processing enterprises. Long distances to extension service centers ($\bar{x}$ = 3.64), was also one of the highest. This implies that geographical accessibility remains a significant barrier. The importance of proximity to extension services has been noted in studies on rural advisory systems in Nigeria, where poor physical access often reduces the uptake of new technologies (Christoplos, 2010).

Lack of timely information or delayed responses from extension agents ($\bar{x}$ = 3.63), indicate that processors often do not receive information when needed. Timeliness is crucial in catfish processing, particularly in preventing post harvest losses, and delays can undermine the effectiveness of extension interventions (FAO, 2013). Inadequate number of training sessions or workshops ($\bar{x}$ = 3.61), also indicates that processors perceive limited opportunities for capacity building. This is consistent with literature emphasizing that insufficient training reduces the ability of small scale processors to improve processing techniques and productivity (Swanson et al., 2003; Duraisumy, 2017).

Language or communication barriers ($\bar{x}$ = 3.16**)**, was also identify as a challenge. However, it is less critical compared to logistical and operational barriers. Nevertheless, communication gaps can still hinder the proper understanding and adoption of technical advice (Eyo, 2016).

Limited awareness of available extension services ($\bar{x}$ = 3.46**)**, implies that some processors are not fully informed about the support that exists. This is in line with previous studies that indicate low awareness reduces the utilization of extension resources and slows technology adoption (Anderson, 2007; Ekong, 2012). High cost or transport barriers in accessing services ($\bar{x}$ = 3.54**)**, reinforcing those financial constraints affect processor participation in extension programs. This echoes findings by FAO (2014) and Ekong, (2012), who identified financial and logistical constraints as persistent obstacles to effective rural service delivery.

Table 4.4 Challenges Faced by Catfish Processors in Accessing and Utilizing Extension Services

	Minor		Moderate		Not a Challenge		Serious		Very Serious			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Mean	SD
Irregular visits by extension agents	12	8.5	46	32.4	9	6.3	37	26.1	38	26.8	3.585	1.1562
Long distance to extension service centers	13	9.2	42	29.6	6	4.2	46	32.4	35	24.6	3.641	1.0807
Lack of timely information or delayed response from extension agents	14	9.9	45	31.7	4	2.8	46	32.4	33	23.2	3.634	1.0347
Inadequate number of training sessions or workshops	14	9.9	43	30.3	7	4.9	42	29.6	36	25.4	3.606	1.1170
Language or communication barriers between processors and extension officers	15	10.6	46	32.4	22	15.5	36	25.4	23	16.2	3.162	1.2696
Limited awareness of available extension services	22	15.5	41	28.9	7	4.9	43	30.3	29	20.4	3.458	1.1275
High cost or transport barriers in accessing extension services	16	11.3	36	25.4	11	7.7	44	31.0	35	24.6	3.535	1.2008
Perceived bias or unequal access to services among processors	13	9.2	52	36.6	7	4.9	47	33.1	23	16.2	3.465	1.0291
Lack of follow up or support after initial contact with extension officers	13	9.2	46	32.4	4	2.8	43	30.3	36	25.4	3.662	1.0443

Source: Field survey, 2025

4.5 Relationship between respondents' socioeconomic characteristics and the benefits of extension services on their income of catfish processors

Results in Table 4.5 shows the correlation between respondents' socioeconomic characteristics and the benefits they receive from extension services. Age shows a weak negative relationship (r = –0.066), meaning older processors do not necessarily benefit more or less from extension services than younger ones. This agrees with findings that age does not consistently predict adoption or benefit levels in small scale fisheries technologies (Owusu and Donkor, 2021). Sex also has a very weak correlation (r = –0.118), suggesting that both men and women benefit in similar ways. Recent studies have similarly reported that gender does not significantly affect access to extension knowledge in many fisheries and aquaculture value chains (Adeogun *et al.,* 2020). Marital status (r = –0.124) shows no meaningful association with perceived benefits, indicating that being married or single does not influence how much extension services improve one's income. This is consistent with research showing marital status rarely predicts technology use or benefit among small scale processors (Aremu and Ibrahim, 2022).

Educational level displays the strongest negative correlation (r = –0.255), which is statistically significant. This suggests that processors with higher levels of education tend to report slightly fewer benefits. A likely explanation is that people with more schooling may already possess business or technical knowledge and therefore perceive extension inputs as less impactful. Similar observations have been made in studies where more educated value chain actors rely less on formal extension due to existing knowledge

advantages (Sarkwah and Adzawla, 2021). Years of experience in catfish processing also show a weak correlation ($r = –0.055$), indicating that newcomers and long term processors benefit in almost the same way. Researchers such as Kamara and Bello (2020) have noted that experience alone does not strongly determine how effectively processors use extension information. Monthly income has a weak positive relationship ($r = 0.109$), which means higher earning processors do not necessarily benefit more. This supports earlier findings that income differences do not automatically translate to better use of extension services in the fisheries sector (Ekong and Udo, 2019).

Membership in cooperatives shows a modest negative relationship ($r = –0.183$), which is statistically significant. This suggests that processors who belong to groups report slightly fewer benefits. In some contexts, cooperative members already share information internally, reducing the added value of external extension inputs. This pattern has been observed in recent work highlighting how peer to peer learning sometimes substitutes for formal extension (Chikere and Anozie, 2022). Access to credit also has a weak negative correlation ($r = –0.119$), indicating that having loans does not largely increase perceived benefits from extension. Studies have shown that financial access does not automatically enhance the usefulness of advisory services unless accompanied by targeted training (Okoye and Mbah, 2021).

Table 4.5 Relationship between respondents' socioeconomic characteristics and the benefits of extension services on their income of catfish processors

	Perceived Benefits	
	Pearson Correlation	Sig. (2 tailed)
Age	0.066	0.436
Sex	0.118	0.161
Marital Status	0.124	0.142
Educational Level	0.255	0.002
Experience in Catfish Processing	0.055	0.516
Monthly Income from Catfish Processing	0.109	0.195
Membership in any cooperative/association	0.183	0.029
Access to credit or loans for business	0.119	0.158
Market place for processed catfish	0.041	0.630

Source: Field survey, 2025

4.6 There is no significant effect of respondents' socioeconomic characteristics and the benefits of extension services on their income of catfish processors

The regression results in Table 4.6 show that the socioeconomic characteristics of catfish processors do not have a significant effect on the benefits they receive from extension services, especially in terms of improving their income. The model has an R value of 0.347, indicating a weak overall relationship between the predictors and the perceived benefits. The R^2 value of 0.120 further shows that only 12% of the variation in the benefits of extension services is explained by the respondents' socioeconomic characteristics, while the remaining 88% is influenced by other factors. Such low explanatory power is common in extension research, where service quality and delivery systems often play a much larger role than personal characteristics (Nwachukwu and Onyeneke, 2021).

Age has a very small and non significant effect (B = –0.029; p = .567). This means the age of processors does not influence how much they benefit from extension services. Studies in aquaculture extension similarly report that benefits from advisory services tend to be uniform across age groups because needs and challenges are similar across the value chain (Adebayo and Ajani, 2022). Sex also shows no significant influence (B = –1.545; p = .172). This suggests that men and women receive comparable benefits from extension. This aligns with recent work showing that extension outcomes in small scale fisheries depend more on service access than gender differences (Ezeani and Onoh, 2023).

Experience in catfish processing has no meaningful effect (B = –0.042; p = .681). In other words, whether a processor is new to the business or has worked for many years does not determine how much they gain from extension services. Earlier findings in fish processing communities also show that practical, hands on training tends to benefit both beginners and experienced processors equally (Ugwumba and Chukwu, 2022).

Membership in cooperatives shows a negative but statistically non significant effect (B = –5.780; p = .069). This indicates that belonging to a cooperative does not translate into greater extension benefits. Some studies suggest that cooperative members sometimes rely more on internal group knowledge than external extension services, reducing the additional value from formal advisory support (Oladipo and Adeniyi, 2023). The effect of access to credit is also non significant (B = –1.747; p = .154). This means financial access does not automatically improve the benefits derived from extension. This is consistent with research showing that credit only enhances extension impact when combined with targeted capacity building (Alawode and Ogunjimi, 2021). Educational level is the only socioeconomic factor with a statistically significant effect (B = –2.449; p = .005). The negative coefficient suggests that respondents with higher education levels report slightly fewer benefits. A possible explanation is that better educated processors may already possess business or technical knowledge and therefore perceive extension inputs as less useful. This pattern has also been observed by other authors who noted that higher

schooling sometimes reduces dependence on extension information in agro processing activities (Iheke and Chidiebere Mark, 2022).

Table 4.6 Significant effect of respondents' socioeconomic characteristics and the benefits of extension services on their income of catfish processors

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	38.074	5.028		7.572	.000
Age	.029	.051	.048	.574	.567
Sex	1.545	1.125	.121	1.374	.172
Experience in Catfish Processing	.042	.103	.035	.412	.681
Membership in any cooperative/association	5.780	3.156	.150	1.832	.069
Access to credit or loans for business	1.747	1.218	.121	1.434	.154
Educational Level	2.449	.867	.232	2.824	.005

R	R Square	Adjusted R Square
0.347[a]	0.120	0.081

Source: Field survey, 2025

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

This study examined the socioeconomic characteristics of catfish processors, the level of extension service delivery available to them, the benefits they derive from these services, the challenges they face in accessing extension support, and how their socioeconomic characteristics relate to the benefits received. The findings provide an in depth understanding of how extension services influence income in the catfish processing sector. The results show an equal gender representation, with males and females each constituting 50% of the respondents. Most processors were married (81.7%), indicating that catfish processing plays a major role in supporting household wellbeing. Respondents were predominantly within the economically active age group, with 32.4% between 25–44 years and a much larger 61.3% between 45–64 years.

Findings on extension service delivery show a moderate level of availability and performance. Extension service availability had a mean score of 3.38, while frequency of visits recorded 3.11, indicating that visits occur but not regularly. Accessibility of officers scored 3.30. Respondents rated the relevance of the information received highly (3.76), and communication skills were also rated strong (3.56). However, some weaknesses were identified. Timeliness of support scored 3.28, coverage recorded 3.36, and follow up support after visits had a relatively low score of 3.16. Overall quality of extension service

delivery was rated 3.21, showing that while services are useful, they are not delivered at an optimal level.

Several challenges hinder effective access to extension services. Irregular visits by extension agents recorded a high mean score of 3.59, while long distance to service centers was the highest challenge at 3.64. Lack of timely information followed closely at 3.63, and inadequate training opportunities scored 3.61. Other challenges include limited awareness of available services (3.46), high cost or transport barriers (3.54), and communication barriers (3.16). These challenges collectively indicate that extension service delivery suffers from operational, logistical, and informational weaknesses.

Correlation analysis showed no significant relationships between most socioeconomic variables and the benefits derived from extension services. Age ($r = –0.066$), sex ($r = –0.118$), marital status ($r = –0.124$), years of experience ($r = –0.055$), income ($r = 0.109$), access to credit ($r = –0.119$), and market location ($r = 0.041$) all showed very weak associations.

5.2 CONCLUSION

Based on the results of the study it was concluded that;

Catfish processing is largely undertaken by mature, economically active individuals with substantial work experience and a strong educational background.

Extension service delivery is present but falls short of meeting the full expectations of processors. While respondents acknowledged the relevance of information received and

the good communication skills of extension officers, issues such as limited visit frequency, weak follow up, inconsistent coverage, and delayed support remain prevalent.

Extension services contribute modestly to the income of catfish processors. Benefits such as income improvement, introduction of innovations, enhancement of product quality, reduction of post harvest losses, and improvement in management confidence were acknowledged but only to a moderate extent.

Processors face multiple operational and structural challenges. Irregular visits, long distance to service centres, delayed information, limited training opportunities, and prohibitive transport costs were identified as serious constraints. Awareness of available extension services was also low, showing a communication gap between service providers and processors.

There was no significant relationships between most socioeconomic characteristics and the benefits received from extension services. This means that factors such as age, sex, income level, and processing experience do not determine how much benefit a processor gains. Only educational level and cooperative membership showed weak negative associations.

5.3 RECOMMENDATIONS

Based on the results of the study, the following recommendations were made;

1. Extension training programmes should be design to accommodate both males and female farmers considering their level of education.
2. Extension services agencies should adopt a structured visit schedule so that processors can anticipate when officers will be available for consultations.
3. Extension programmes should broaden their focus beyond technical training to include business development skills such as record keeping, pricing strategies, and cost management.
4. Public awareness campaigns should be intensified to inform processors about available extension programmes, locations, and benefits.
5. Extension services should be designed to be inclusive and accessible to all categories of processors, regardless of age, sex, income, or experience.

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RESEARCH QUESTIONNAIRE

DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT,
FACULTY OF AGRICULTURE, UNNIVERSITY OF BENIN, BENIN CITY, NIGERIA

Dear Respondent,

I am a final year student of the above named Department and University carrying out a research project on: **"Effects of Extension Services on Income Among Catfish Processors in Ikorodu Local Government Area Lagos State".** I solicit your cooperation to kindly answer the questions below as correctly as possible so as to ensure reliable data for this study.

This research work is purely for academic purpose and all information to be supplied will be treated with absolute confidentiality and used strictly for this study only.

Thanks for your anticipated cooperation.

Yours faithfully,

ASONYE CHIJIOKE JOACKIN
Researcher.

INSTRUCTIONS: Please tick (√) and write where necessary.

State:……..……..……

Local Government Area……..……

Town/Village/Community .....

SECTION A: SOCIO ECONOMIC CHARACTERISTICS OF THE RESPONDENT

(1) Age of respondents (Years): _____

(2) Gender: Male ( ) Female ( )

(3) Marital Status: Single ( ), Married ( ), Divorced ( ), Widowed ( )

(4) Educational Level: No Formal Education ( ), Primary ( ), Secondary ( ), Tertiary ( ) Vocational ( )

(5) Household Size: _____

(6) Years of Experience in Catfish Processing: _____

(7) Monthly Income from Catfish Processing: ( ) Below ₦50,000 ( )₦50,001–₦100,000
( )₦100,001–₦150,000 ( )Above ₦150,000

(8) Are you a member of any cooperative/association?( ) Yes ( ) No

(9) Do you have access to credit or loans for your business? ( )Yes ( ) No

(10) Where do you mainly sell your processed catfish? ( ) Local market ( ) Wholesalers ( )Online ( ) Export ( ) Others: _____

SECTION B: ASSESS THE CURRENT STATE OF EXTENSION SERVICE DELIVERY

How do assess extension service delivery?

	Questions	**Excellent**	**Good**	**Fair**	**Poor**	**Very Poor**
11	How would you rate the availability extension services in your area?					
12	How would you describe the frequency visits by extension agents?					
13	How would you rate the accessibility extension officers when needed?					
14	How would you rate the relevance information provided during training?					
15	How would you rate the communicati skills of the extension agents?					
16	How would you rate the timeliness of t support you receive?					
17	How well do extension services addre your specific processing needs?					

18	How would you rate the coverage catfish processors in your area?					
19	How would you rate the follow support after training or visits?					
20	How would you rate the quality extension service delivery?					
21	Others					

SECTION C: EVALUATE THE EFFECTS OF EXTENSION SERVICES ON THE INCOME OF CATFISH PROCESSORS

How effective is the effects of extension services to your income

	Questions	**Very Effective**	**Effective**	**Neutral**	**Not Effective**	**Not at Effective**
22	How effective have extension servic been in improving your income fro catfish processing?					
23	How would you rate the over effectiveness of extension services enhancing your capacity to genera income from catfish processing?					
24	How would you rate the effectiveness in introducing new too or innovations to you?					
25	How effective have they been improving the quality of yo processed catfish?					
26	How effective are the services enabling you to mentor or tra others?					
27	To what extent have extens services increased your confide					

	in managing your business?					
28	How effective are the services improving your overall well being?					
29	How effective are the extens services in helping you reduce p harvest losses in catfish processir					
30	How effective have they been improving your access to be markets or buyers?					
31	Others					

SECTION D: IDENTIFY THE CHALLENGES FACED BY CATFISH PROCESSORS IN ACCESSING AND UTILIZING EXTENSION SERVICES

What challenges do you face while trying to access and make use of extension services?

	Question	**Very Serious**	**Serious**	**Moderate**	**Minor**	**Not a Challenge**
32	Irregular visits by extension agents					
33	Long distance to extension service centers					
34	Lack of timely information or delayed response from extension agents					
35	Inadequate number of					

	training sessions or workshops					
36	Language or communication barriers between processors and extension officers					
37	Limited awareness of available extension services					
38	High cost or transport barriers in accessing extension services					
39	Perceived bias or unequal access to services among processors					
40	Lack of follow up or support after initial contact with extension officers					
41	Others					