ADOPTION OF INNOVATION BY SMALLHOLDERS' OIL PALM FARMERS IN OVIA NORTH EAST LOCAL GOVERNMENT AREA, EDO STATE, NIGERIA

BY

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

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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 FULFILLMENT FOR THE REQUIREMENTS FOR THE AWARD OF BACHELOR'S DEGREE IN AGRICULTURE (OPTION: AGRICULTURAL ECONOMICS AND EXTENSION SERVICES)

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CERTIFICATION

This is to certify that the research work on the adoption of Innovations by smallholders oil palm farmers' in Ovia North East Local Government Area of Edo State, Nigeria, was carried out by **Blessing Onyayege ADAKOLE** with Matriculation Number; **AGR2000001** under the supervision of the department of Agricultural Economics and Extension Services, Faculty of Agriculture, University of Benin, Edo State, Nigeria.

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_____ _____

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DEDICATION

This project is dedicated to Almighty God, the source of my life and the one who guided me throughout my undergraduate program at the University of Benin.

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ABSTRACT

This study examined the adoption of Innovations by small-holders oil palm farmers in Ovia North East local government Area Edo state, Nigeria. This studies specifically examine the socioeconomic characteristics of smallholder oil palm farmers in Ovia North East Local Government Area, Edo State, Nigeria, the agricultural innovations smallholder oil palm farmers were aware of in the area, level of adoption of the innovations by oil palm farmers in the study area, the farmers information sources on oil-palm technologies, motivations for farmers' adoption of oil palm technologies, constraints affecting the adoption of the innovations among smallholders oil palm farmers.A multistage sampling procedure was used to select 120 smallholders oil palm farmers from six purposively selected communities. Data were collected structural questionnaire, collected data were analysed using descriptive statistic (frequency count, percentage and mean). For the objectives inferential statistics (multiple regression) was used to test the hypothesis.

The results reveals that majority of the farmers in the area were predominantly male (63.33%), (67.5%) of the respondents were aged of 30- 49 years and married (50%). Also (70.83%) of the respondents cultivated a farm size of 1- 3 hectares, With annual income of ₦500,000-₦1,000,000 and had limited access to extension services, the had high awareness to traditional innovations such as pest and diseases managements, soil improvement technique. However, ICT- based Innovative tools, weather predictive information and Mechanized harvesting tools remained low .Adoption for fertilizer (mean = 3.33) and pest and disease practices (mean = 3.18) were relatively high but low for mobile application (mean = 1.45) and mechanized harvesting tools (mean = 1.35). The major motivation for farmers adopt of Innovations included: higher income (100%), fellow farmers/ peer influence (99.17%) and better crop yield ((98.32%). The regression results reveals that, there is no significant relationship between most of the socioeconomic characteristics and adoption. However annual

income (p= 0.0005), access to extension services (p= 0.000) and awareness of agricultural innovations (0.004) had significant influence in the adoption of Innovations. Key constraints were high cost of adoption (99.17%) limited access to credit (98.33%), weak extension services (95.00%), inadequate training opportunity (95.00%), and limited access to modern agricultural. Although response demonstrate readiness to adopt innovations however the limit outreach by extension agents and insufficient supports significantly impeded their adoption of oil palm innovations. This study recommended expanded extension outreach, targeted training programs, access to land, financial supports to increase the level adoption of oil palm innovations among smallholders' oil palm farmers and its productivity.

CHAPTER ONE

INTRODUCTION

1.1 Background of study

Agriculture plays a vital role in the economies of many developing countries, with smallholder farmers serving as the main drivers of agricultural output (Zebenay *et al.,* 2024).

Among the Nigeria's major cash crops is oil palm (*Elaeis guineensis*) which plays a significant role, being cultivated extensively by smallholder farmers for household consumption and commercial purposes. Edo State especially Ovia North East Local Government Area offers ideal environmental conditions that favor the cultivation of oil palm (Omoti 2009).

Although oil palm farming holds great promise for improving rural incomes and driving economic progress, many smallholder farmers struggle with challenges such as low productivity, use of outdated farming techniques, and limited access to modern agricultural innovations. Innovations in this context refer to new practices, including improved seedlings, modern processing equipment, efficient harvesting techniques, fertilizers, and digital-based advisory services (World Bank, 2007). Embracing these innovations is essential for boosting farm output, reducing manual labor, and improving income (Akinwumi et al 2017).

Nevertheless, the rate at which smallholder farmers adopt such innovations remains low, mainly due to limited knowledge, financial constraints, inadequate extension services, and socio-cultural norms (Akinola *et al.,* 2010). Understanding these influencing factors is crucial to designing appropriate policies and programs that can encourage wider adoption of agricultural innovations.

Smallholder oil palm farmers are responsible for approximately 80% of Nigeria's total oil palm output, yet they typically work independently and lack adequate resources to enhance their productivity. However, if these farmers are organized into strong cooperatives or farmer groups, they could effectively advocate for supportive sector policies aimed at tackling challenges such as limited access to modern technology (innovation) and weak farm management practices.

Typically, they farm on plots ranging from 1 to 5 hectares, often using mixed cropping methods to maximize land use. For instance, food crops like maize, melon, millet, groundnut, and cassava are commonly interplanted with oil palm in the early years of growth, especially before the canopy of oil palm trees closes (Okere, 2015; NIFOR, 2012).

Although these cropping systems are common, the application of improved management techniques such as timely weeding, mulching, Irrigation and fertilizations is not widely adopted due to the additional costs and labor required.

Many farmers are reluctant to invest in such practices, even though they significantly increase yields (Amaechina & Eboh, 2006).

In Nigeria, the palm oil sector is largely dominated by subsistence farmers, who account for about 80% of the country's total output (Bankole *et al 2018*). These farmers often depend on family labor and traditional processing methods, which are inefficient and affect product quality (Omoti, 2001; Gordon, 2005; Onoja and Achike, 2015). Processing and marketing involve multiple steps such as harvesting, sorting, processing, storage, and transportation all of which impact the final product's value. In addition, fluctuations in market prices, especially between seasons, pose a challenge to profitability.

The adoption of high-tech processing equipment has the potential to improve efficiency and product quality, but such technologies are underutilized due to high costs and limited access. Experts suggest that capital-intensive, integrated processing systems could drive industrial transformation in Nigeria's palm oil sector (Lee *et al*, (2012); Omoti, 2001). Despite these opportunities, most farmers continue to operate at a subsistence level using outdated methods, even though improved varieties and processing technologies are available from institutions like NIFOR (CBN, 2012; PIND, 2011).

This study therefore aims to investigate the extent to which smallholder oil palm farmers in Ovia North East Local Government Area have adopted agricultural

innovations. It also seeks to identify the factors influencing adoption, the benefits experienced by adopters, and the challenges faced. By addressing these issues, the research will contribute valuable insights that can guide stakeholders—including policymakers, extension agents, and development organizations—towards supporting smallholder farmers more effectively, enhancing productivity, and promoting sustainable agricultural practices.

1.2 Problem Statement of the study

Oil palm farming plays a vital role in Nigeria's agricultural landscape, supporting the livelihoods of millions of small-scale farmers and making notable contributions to the national economy (Omoti, 2009). Historically, Nigeria led the world in palm oil production, but has since fallen behind global leaders such as Indonesia and Malaysia, primarily due to low output levels and outdated farming techniques (FAO, 2018). In Ovia North East Local Government Area of Edo State, most oil palm growers are smallholders who still rely on conventional farming practices, resulting in low productivity and diminished profits (Ricardo et al 2010).

To enhance better production various research by research institute like Nigeria institute for oil, (NIFOR), academic institution, government and non-government agency has been made and series of innovation brought to the farmers.

The government and non-government agencies through the Extension and private practitioners has strengthened the information distribution system so that new ideas,

object and improved practices could reach the Farmers in urban and rural areas. The adoption among smallholders famers in this area remains very limited (Fatunbi *et al.,* 2015).

The role of extension services in spreading these innovations is also undermined by poor funding, logistics challenges, and insufficiently trained extension agents (Arokoyo et al 2012).

Have these innovations been adopted by the smallholders' oil Palm farmers in Ovia North East Local Government Area?

Hence, this study focuses on adoption of innovation by smallholders' oil palm farmers in Ovia North East Local Government Area.

Although several modern agricultural technologies have been introduced—including improved palm seedlings, mechanized processing tools, advanced fertilization methods, and pest control strategies adoption among smallholder farmers in this area remains very limited (Fatunbi *et al.,* 2015). This low uptake is influenced by several challenges. Chief among them is limited access to timely and reliable agricultural information, which hampers farmers' knowledge and acceptance of new methods (Zebenay *et al.,* 2024). The role of extension services in spreading these innovations is also undermined by poor funding, logistical challenges, and insufficiently trained personnel (Arokoyo et al 2012).

Considering the pivotal role that innovation plays in boosting agricultural efficiency, ensuring food security, and improving rural livelihoods, it is essential to level up the adoption of new technologies (innovation) among oil Palm farmers in Ovia North East Local Government Area (IFPRI, 2019).

Research Questions:

The above problems prompted the following questions.

i. What are the social economic characteristics of small holders oil palm farmers in Ovia North East local government area, Edo state, Nigeria?
ii. What are the innovations that smallholders oil palm farmers are aware of in Ovia North East local government Area, Edo state.
iii. What is the level of adoption of innovation among smallholders' oil palm famer's in Ovia North East Local government?
iv. What are the information source among smallholders oil palm farmers in Ovia North East local government area ,Edo state .
v. What are the motivations for farmers' adoption of oil palm technologies.
vi. What are the constraints affecting the adoption of oil the innovations?

1.3 Objectives of the Study

General Objective:

This research aims to explore the adoption of innovation among smallholder oil palm farmers in Ovia North East Local Government Area, Edo State.

Specific Objectives:

i. To determine the socioeconomic characteristics of smallholder oil palm farmers in Ovia North East Local Government Area, Edo State, Nigeria
ii. To identify the agricultural innovations smallholder oil palm farmers are aware of in the area.
iii. To ascertain the level of adoption of the innovations by oilpalm farmers in the study area.
iv. Examine the farmers information sources on oilpalm technologies
v. To examine motivations for farmers' adoption of oilpalm technologies
vi. To identify constraints affecting the adoption of the innovations among oil palm farmers' in Ovia North East local government area, Edo state.

1.4 Hypotheses of the Study

The study proposes the following hypotheses:

H_{o1}: There is no significant relationship between farmers' socio-economic characteristics and the adoption of agricultural innovations.

1.5 Justification of the Study

Adoption of agricultural innovations is essential for increasing farm productivity, ensuring food security, and fostering sustainable rural development. Given that agriculture is the economic backbone of many Nigerian rural communities, and that smallholder farmers play a crucial role in national development, promoting

innovation is a key. As one of the country's major cash crops, oil palm offers vast opportunities for reducing poverty, creating rural jobs, and generating export earnings (Omoti, 2009; FAO, 2018). Palm oil provide employment for a lot of people this reduces poverty , it contribute to foreign exchange earning and substantial development in rural communities therefore effort should be put in place to revamp the oil palm sector.Despite the availability of improved techniques and inputs, yields among smallholder oil palm farmers in areas like Ovia North East remain disappointingly low. Identifying and understanding the factors that drive or hinder the adoption of innovation is fundamental to empowering farmers to enhance output and profitability. Without widespread and sustained use of available technologies, efforts by government and development organizations will have limited success. By pinpointing the enablers and barriers, stakeholders can develop more effective and context-appropriate solutions.

Moreover, this study fills a significant research gap, as there is little localized research that focused specifically on oil palm farmers in Ovia North East LGA. While national-level studies exist (Arokoyo, 2012; Awotide *et al.,* 2015), they often overlook local variables—such as cultural attitudes, infrastructure, and institutional dynamics—that strongly influence farmers' decisions. This study will generate insights tailored to the area's unique context, aiding in the design of relevant and acceptable interventions.

Additionally, as international competition in palm oil production intensifies—especially with countries like Indonesia and Malaysia leveraging innovation to maintain dominance—Nigeria must support its smallholders to remain competitive. This research will provide useful suggestions for improving extension services, financial access, and policy formulation aimed at inclusive agricultural development. Finally, the study will make a valuable contribution to academic literature by deepening understanding of innovation adoption among smallholder farmers, particularly in the context of oil palm production. It will also serve as a reference point for future research in agricultural development, rural transformation, and smallholder livelihood enhancement.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Smallholders farming in Edo state Nigeria

Oil palm is cultivated by Smallholder farmers on the plot of 1 to 4 hectare, additionally, some government agricultural programs involve oil palm cultivation on individual land holdings of 5 to 10 hectares. Modern smallholder farms can reach commercial sizes of up to 100 hectares. Tenera variety is predominantly grown in this system, with manual labor and proper plant spacing being widely practiced.(RSPO 2023).

According to the baseline study carried out by Fatai e*t al.* (2023) under the RSPO framework most smallholder farmers in the area acquired their land through inheritance. Regarding labour, hired workers accounted for the largest share. Also,, paid labour is the primary source of farm labour for smallholder farmers in the region.Some of the Smallholders' oil palm farmers cultivate pisifera and Dura. Cultivation of dura variety is likely to result in lower palm oil yields and most farmers growing dura and pisifera varieties .(Woittiez *et al.,* 2016).

The motivations for the adoption of improved oil palm seedlings such as Tenera , fertilizer application and recommended agronomical practices is the expectations by smallholders farmers to obtain higher yielding crops that will increase their level of income for a better living standard. Smallhoders' Farmers often intercrop oil palm

with food crops such as cassava to ensure food security, since oil palm is a perennial crop that requires a long time to reach maturity. This practice serves as a form of insurance, providing both food and income while waiting for the main crop to mature, and also helps to optimize the use of available farmland. Similarly, farmers adopt practices such as maintaining proper planting density and spacing, regular pruning, and general slashing to reduce weed competition, particularly when the palms are young. Observing recommended planting distances and densities is crucial, as it enhances crop growth and productivity, especially in intercropping systems (Imogie *et al.,* 2018)

In Africa, practically no part of the products from an oil palm processing is considered waste (IPPA, (2010). The crop has one of the most robust value chains of all crops (Ishola *et al.,* 2020). The processed fruits from an oil palm tree produces palm oil, palm kernel and the fibrous palm used as biomass fuel. According to Bankole et al. (2018), Smallholders' oil palm farmers in Edo state contribute to household income and the state agricultural national GDP.The activities of smallholders oil palm farmers in this area provide raw materials for local industries that engage in oil palm processing.

2.2 Adoption of Innovation in the Agricultural Sector among smallholders oil palm farmers

Innovation refers to an idea, practice, or object perceived as new by an individual or any adopting unit. It entails converting creative concepts into practical solutions that

enhance efficiency, effectiveness, or address previously unmet needs. Over the past century, technological advancements have played a pivotal role in shaping modern agriculture (Clark, 2002). In addition to technological progress, institutional changes have also significantly influenced the agricultural sector. Innovations—such as new methods, products, and procedures—are central components of both technological and institutional transformation.

Adoption, in this context, is the decision to fully embrace an innovation as the most beneficial option. It results from a dynamic decision-making process that often involves acquiring knowledge through information gathering and practical experimentation. The idea of innovation has encouraged a more integrated approach to the generation and application of agricultural knowledge.(Roger 2003).

In agriculture, innovation adoption involves the acceptance and implementation of new ideas, technologies, or practices by farmers to improve productivity and promote sustainability. Rogers (2003) defines innovation as anything perceived as new by an individual or a group. According to Feder et al. (1985), the adoption of agricultural innovations is influenced by a range of factors, including the characteristics of individual farmers, socio-economic and institutional contexts, and the inherent qualities of the innovation itself.

Sustainable innovations in agriculture go beyond mere technical solutions; they often demand significant changes in societal structures and social systems. Traditionally,

agricultural innovation followed a linear model where knowledge was generated in academic institutions and disseminated to farmers through government-funded extension services. This model assumed that the technologies developed by scientists represented the best available understanding of agricultural systems. Studies under this model typically explored why farmers failed to adopt superior technologies and what factors could potentially accelerate adoption rates (Leeuwis and Van den Ban, 2004).

Although the linear model of technology transfer significantly contributed to increased agricultural yields and output, it has faced growing criticism for overlooking important concerns such as sustainability and its limited ability to address broader rural development objectives. These objectives encompass the diverse roles that farms and agroeconomic system play within rural communities (IAASTD, 2009). In response to these shortcomings, a systems-based approach to agricultural development has gained traction.

The success of agricultural development is closely linked to the effective generation and application of knowledge. Investments in knowledge—particularly through science and technology—have been central to strategies aimed at achieving sustainable agricultural growth. While many of these investments have yielded positive results (IAASTD, 2008), there is a growing acknowledgment that conventional agricultural science alone cannot fully support the innovation needed in

the farming sector (World Bank, 2006; 2008). Consequently, agricultural research for development must evolve and adopt new approaches to stay relevant in a rapidly transforming global environment (IAASTD, 2008).

Findings "Convergence of Sciences" research initiative (Van Huis *et al.,* 2007) revealed that merely improving farm-level yields through technical innovations is insufficient to substantially reduce poverty. This is particularly true for smallholder farmers in West Africa, who operate within very limited opportunities for improving their livelihoods (Nederlof *et al.,* 2007). Under current institutional arrangements, these farmers gain little from increasing productivity alone.

According to Hounkonnou *et al.* (2012) on the importance of institutional innovation, they discussed that meaningful change must include mechanisms such as fair compensation, minimum price stability for small-scale producers to encourage investment, land tenure security, strong political backing to counteract the effects of cheap imports, and support for collective action among farmers to enhance market access under more equitable conditions.

In oil palm cultivation, innovations encompass the adoption of improved seed varieties, modern processing methods, enhanced fertilizer application techniques, and the use of mechanized equipment. Embracing these innovations can significantly boost yields, enhance product quality, and increase the income levels of smallholder oil palm farmers.

However, traditional palm oil production methods negatively affect both the quality and quantity of oil that can be extracted (FAO, 2002). Such methods often result in crude palm oil with elevated levels of free fatty acids (FFA), moisture, and impurities. The continued use of outdated practices, particularly during the threshing stage, has led to the widespread habit of heaping harvested fruit bunches. This allows fermentation to occur, making manual removal of fruits easier, but also substantially increases the FFA content, leading to higher refining losses (NIFOR, 2009).

The presence of impurities and high moisture content in the final output is caused by lack of adoption of proper clarification technologies while about 75% of the available oil in the fruit is lost due to the dearth of adoption of mechanized extraction methods (PIND, 2011).

2.3. Diffusion and awareness of Innovations among smallholders oil palm farmers

Diffusion refers to the process through which an innovation is communicated over time among members of a social system, using specific communication channels. The main content of this communication typically involves new ideas.The world is referred to as a global village because modern communication networks have bridged distances, allowing people across the globe to connect and share information within seconds through information and communication technology.(Alakpa et al, 2019).

The primary aim of agricultural innovation projects in rural communities is to motivate farmers to embrace improved technologies. Effective transfer of knowledge and technology from developers to farmers promotes agricultural development. Adoption, however, is a psychological process through which an individual moves from initial awareness of a new idea to its full integration into their regular practices. Hence, for farmers to adopt innovations, they must first be informed and progress through various stages known as the adoption process.(Udemezue and Agwu, 2018)

In agricultural extension, the use of different communication tools and channels has become an efficient method for transferring new ideas and technology. The research–extension–farmer relationship can only function effectively when innovations are presented in a clear and comprehensible form. Agricultural communication is distinctive and audience-specific, as it mainly deals with technical and economic information related to farming activities. Agricultural extension plays important roles in the diffusion of agricultural innovations to smallholders oil palm farmers, extension interventions require the integration of several key components, including appropriate technologies, efficient extension service delivery, improved access to agricultural inputs, reliable market support systems, and adequate infrastructure. Together, these elements aim to enhance agricultural productivity and improve the living standards or welfare of rural households engaged in farming and related activities (Qamar, 2015).

The awareness of innovations by smallholders oil palm farmers in region depends factors such as their level of education , access to training and contacts with extension services.((Okere *et al.,* 2022).)

According to Rogers (2003) there are five adopter categories that influence the level of adoption of innovation in a society. These categories are as follows:

-Innovators: These individuals are enthusiastic about trying out new ideas and are the first to adopt innovations within their communities. Their curiosity often leads them beyond their local networks.

-Early Adopters: Often respected members of their communities, early adopters are the first within the local context to embrace innovations. Change agents often target them to help spread new ideas through the social system.

-Early Majority: This group adopts innovations just before the average member of society. They typically take time to consider an innovation before fully embracing it and frequently interact with their peers during the decision-making process.

-Late Majority: These individuals are skeptical and cautious about adopting innovations. They usually wait until a significant portion of the social system has adopted the innovation. They often have lower levels of education and participate less in formal groups.

-Laggards: The final group to adopt an innovation, laggards tend to associate with individuals who hold traditional values. By the time they adopt an innovation, it is

often outdated. They are generally distrustful of change agents and innovations, and their traditional outlook often slows the adoption process.

In Nigeria, the limited adoption of processing technologies by smallholders oil palm processors has led to low-quality outputs and reduced oil extraction rates. However, community-based social innovations such as the shared use of palm oil processing facilities can be scaled and disseminated to strengthen the technological capabilities of small-scale producers.

The success of agriculture largely depends on the efforts of rural farmers. Traditionally, various communication methods such as town criers, wooden gongs, and oral announcements were commonly used to share agricultural information. However, these traditional media have become less effective due to technological advancement and population growth (Norrish, 2001). In recent years, several information and communication technologies (ICTs) including mobile phones, internet services, radio, and television have emerged as vital tools for agricultural communication. Among these, radio and television remain the most widely utilized ICTs for agricultural extension delivery in Nigeria (Arokoyo *et al.,* 2005).

-Types of Innovations in the Agricultural Sector

The agricultural sector is rapidly evolving through the adoption of smart farming technologies and improved production systems. According to the Oslo Manual (OECD & Eurostat, 2005), innovation involves introducing new or significantly improved products, processes, marketing methods, or organizational practices.This

framework identifies four main types of innovation: product, process, marketing, and organizational innovations.

Product innovation includes developing improved goods or services such as high-yield or disease-resistant oil palm varieties. For instance, NIFOR has bred oil palm resistant to Fusarium wilt, helping farmers replant in previously affected areas (Okwuagwu et al,2005; Cochard *et al.,* 2005).

Process innovation focuses on better production and processing methods—e.g., the twin screw press, thresher drum, and clay bath technique—which enhance oil extraction efficiency and product quality.

Marketing innovation involves new branding, packaging, or pricing strategies that expand market access for palm oil and related products.

Organizational innovation refers to improved management systems and cooperative arrangements that strengthen coordination, resource sharing, and productivity among smallholder farmers.

Together, these innovations promote efficiency, sustainability, and competitiveness in Nigeria's agricultural sector, particularly among smallholder oil palm farmers in Edo State.

The use of Information and Communication Technology (ICT) has introduced a modern method for exchanging, receiving, and transmitting information, which can enhance the knowledge and capabilities of individual workers (Chhachhar et al,

2014]. For smallholder farmers, ICT plays a vital role in boosting household income by increasing productivity through access to relevant information. By providing timely and useful data, farmers can enhance their output in agricultural activities. Therefore, it is essential for those in the farming sector to actively embrace ICT and other agricultural innovation, as it facilitates better productivity, improved access to markets, and sustainable economic development . Moreover, ICT offers innovative means of communication and information sharing that support the development of farmers' knowledge and skills.(Arokoyo *et al.,* 2005).

2.4 Benefits and Importance of Innovation Adoption by Smallholder Oil Palm Farmers in Ovia North East LGA, Edo State, Nigeria

The adoption of innovation is crucial in the agricultural sector as it encourages youth participation, boosts productivity and profitability, and promotes the sustainability of smallholder oil palm farming in Ovia North East Local Government Area. Innovations such as improved seedlings, supportive agricultural policies, modern farming equipment, and high-efficiency agronomic practices play a key role in addressing the challenges faced in oil palm production.

The active participation of smallholders oil palm farmers is key to maintaining Nigeria's domestic palm oil supply, particularly in the southern regions such as Edo State, where the crop thrives due to favorable climatic and soil conditions (Bankole et al2018).

One major benefit is the increase in productivity. The Agriculture Promotion Policy (APP) has significantly influenced outcomes in Edo State by ensuring effective policy implementation. This includes the dissemination of agricultural information, the spread of technical knowledge, the organization of training programs, and the provision of financial assistance and incentives (Ajakaiye et al ,2018; Osagie et al, 2019).

The Agricultural promotion policy(APP) has also led to noticeable improvements in oil palm production and productivity. By supplying farmers with improved seedlings and encouraging the use of best agricultural practices, the policy has contributed to higher yields (Adams *et al.,* 2020). Research by Olukosi and Akangbe (2019) confirms that adopting better seedlings and agronomic methods has substantially boosted palm oil output. This rise in production not only satisfies local consumption but also opens up opportunities for export.

Additionally, the policy places strong emphasis on training and capacity development for farmers, processors, and other key stakeholders in the palm oil value chain. Through workshops, seminars, and extension services, stakeholders have gained improved knowledge and skills in modern techniques of oil palm cultivation, harvesting, processing, and marketing.

Furthermore, production risks, often influenced by environmental conditions and farming practices, can be significantly reduced when farmers adopt best management

practices. These practices lead to increased yields, which, in turn, enhance farmers' ability to repay credit and improve financial stability (Baiyegunhi and Fraser, 2014). Approximately 80% of oil palm fruit processors in Nigeria are women (Carrere, 2010; FAO, 2002; PIND, 2011). Traditionally, they have carried out processing activities in shared community facilities known as Ekus. This form of social innovation has allowed women to collectively utilize resources in palm oil production. Social innovations offer practical and impactful ways for individuals to combine efforts and address urgent social challenges that have been poorly managed or entirely neglected by both the market and government (EU, 2014). According to Mulgan (2006), such innovations are driven by the intention to fulfill specific social needs through creative services and initiatives.

According to Mulgan (2006), social innovations can be enhanced, replicated, and spread by either the government or private sector as part of policy efforts aimed at addressing critical social challenges. Nuemeier (2017) emphasizes that gaining insight into how social innovations emerge can inform policies that support their expansion and adaptation, ultimately increasing their effectiveness in solving specific social problems. The European Union (2014) also highlights that intentional public efforts to replicate and scale up successful social innovations offer a practical approach to tackling societal issues.

The adoption of innovation promotes youth involvement and creates employment opportunities. According to Nwachukwu (2008), young people represent a vital human resource for advancing agriculture and technological innovation in any nation. They are among the most valuable assets and serve as key drivers of change that can be harnessed for national development.

2.5 Factors Influencing Adoption of Innovations among smallholders' oil palm farmers

.Factors influencing smallholders farmer's adoption of innovations include **socioeconomic factors** such as ; age, gender, education, marital status, household size, off-farm income, farming experience, group membership, attitude, cultural beliefs, and religion (Makate *et al.,* 2018; Mutenje *et al.,* 2019; Okello *et al.,* 2019; Oyinbo *et al.,* 2019; Vidogbéna *et al.,* 2016). Studies have shown that older smallholder farmers tend to show less interest in adopting new or emerging technologies (Okello *et al.,* 2019). When older farmers do adopt innovations, their decisions are often shaped by additional considerations such as the relative cost of the technology, perceived ease of use, and the perceived benefits or advantages of the new practice (Wesseler *et al.,* 2017). It is also find that, male and female farmers often have different preferences when selecting new technology or innovation, with male smallholder farmers generally adopting new innovations more quickly than their female counterparts (Mudhara *et al.,* 2003; Murage *et al.,* 2015). However, in female-headed households, the decision to adopt new agricultural technologies can

be influenced by the size of the farm (Fisher & Carr, 2015). likewise,education level of smallholder farmers in Africa positively affects their adoption of new technologies (Oyinbo *et al.,* 2019). Farmers with some form of formal or informal education tend to adopt innovations more quickly than those without any education.Similarly, the marital status of smallholder farmers has been found to affect their decisions to adopt new technologies (Omotilewa *et al.,* 2019). Compared to single farmers, married smallholders tend to adopt innovations later because family responsibilities limit the financial resources available for investing in new technologies (Matata *et al.,* 2010). Household size also plays a role, as it reflects both labor availability and financial obligations; larger households often have higher financial commitments, which can reduce the likelihood of adopting new practices (Claessens *et al.,* 2012; Orr, 2000).

Off-farm income, on the other hand, has a positive influence on technology adoption among smallholder farmers in Africa (Mudhara *et al.,* 2003; Ojiem *et al.,* 2006). It provides an alternative source of funds that can be used to overcome financial constraints and invest in innovations. For example, Diiro (2013) found in Uganda that households with off-farm income adopted improved maize varieties more intensively than those without such income, demonstrating how additional earnings can enhance adoption rates.

Farm characteristics also influence the adoption of innovations among smallholder oil palm farmers. Access to extension services positively affects adoption, as

extension agents provide information on new innovations and their benefits, enhancing farmers' uptake (Adejuwon, 2018; Oyinbo *et al.,* 2019). Farm size is another key factor influencing adoption of innovation by smallholders' farmers, with larger farms generally adopting innovations faster than smaller farms. For instance, farmers with around 4 hectares tend to adopt new technologies more quickly than those cultivating only 1 hectare (Makate *et al.,* 2019; Rapsomanikis, 2015). Marenya and Barrett (2007) as well as Walker *et al.* (2012) observed that smallholder farmers with higher farm incomes are more financially capable of adopting new Additionally, The availability of labor influence the adoption of innovation among smallholders oil palm farmers in this region (Dadi *et al.,* 2004).Secure land ownership has been shown to promote the adoption of new technologies among smallholder farmers (Ojiem *et al.,* 2006), whereas the absence of clear land tenure can discourage the adoption of large-scale agricultural innovations (Djurfeldt *et al.,* 2014).

Institutional factors such as access to infrastructure play a significant role in encouraging smallholder farmers to adopt new technologies (Kassie *et al.,* 2015). Additionally, government policies have been identified as important determinants that influence farmers' adoption of innovations (Wambugu *et al.,* 2011).

(Fadeyi et al., 2022) emphasized that governments frequently implement policies aimed at either promoting or discouraging certain technologies based on desired objectives. When specific technologies are promoted, smallholder farmers tend to

adopt them more quickly due to the accompanying government support in areas such as training and research.

2.6 constraints to Adoption of innovation .

innovation system has a dual structure: part suited to rapid innovation, and part stubbornly resistant to change. There various kinds of factors that hinders adoption of innovation by smallholders of oil palm farmer's in ovia North East Local Government Area, Edo state, Nigeria .

In recent years, the oil palm sector in this area has encountered obstacle related to sustainability, environmental conservation, and market access (Nweke and Onukala, 2017). According to Banmeke *et al.* (2011) there is generally a low level of awareness regarding the technologies disseminated by NIFOR, which has consequently led to limited adoption of these innovations. Factors such as land tenure arrangements and a lack of interest in NIFOR-promoted oil palm technologies have significantly influenced the adoption level.

(I) Limited Access to Credit Facilities

Limited access to credit remains a significant challenge for farmers in Edo State. The inability to secure loans from banks and formal financial institutions has compelled many oil palm farmers to rely on informal local lenders, who often charge exorbitant interest rates. This situation hinders their capacity to expand their farmland or invest in additional inputs, ultimately leading to reduced output and lower profits (Edoumiekumo 2009).

Ayob *et al.* (2015) highlighted that low income levels are a major factor discouraging local youths from participating in the plantation sector and among smallholder oil palm farmers, many depend on informal credit from local traders; however, these funds are usually limited and are often conditional upon the farmers selling their Fresh Fruit Bunches (FFB) to the lending traders.

Lack of institutional credit by smallholders oil palm farmers limit their ability to purchase improved oil palm seedlings, fertilizers, and mechanized harvesting tools as they rely on their personal savings (Udemezue and Agwu (2018)

(ii) Inadequate Extension Services and Training

Extension services, which are designed to provide farmers with technical support and monitor input effectiveness, are typically scheduled every two weeks. However, poor government funding has significantly hampered these services, forcing research institutions to ask farmers to pay for them.

According to Agbarevo and Obinne (2010), weak extension systems have restricted the spread of new farming technologies. Insufficient funding, a shortage of trained personnel, and a lack of logistical support are key obstacles facing the Agricultural Development Programme (ADP). The low frequency of extension contacts in Edo weak the level of awareness of smallholders farmers about the availability of agricultural innovations and the potential benefits of innovation.

Effective extension services are crucial for increasing agricultural productivity, profitability, and farmers' quality of life. Where public funding is lacking, the continuation of these services depends on farmers' readiness to shoulder the cost. Successful service delivery also demands financial support for transportation, communication tools (e.g., megaphones, billboards), security, experimental farm plots like Small Plot Adoption Techniques (SPAT), training centers, and public outreach methods such as media campaigns or town criers. The severe shortage of extension agents—one agent serving 1,189 farmers in Nigeria compared to the recommended 1:75 ratio for developing countries (Agbamu, 2005)—further highlight the system's inadequacy.

(iii) Soil Fertility and Environmental Constraints.

Smallholder oil palm farmers frequently neglect essential soil (edaphic) factors such as pH, moisture content, texture, and structure, which are critical for optimal crop performance. A soil suitability assessment by Oviasogie and Okoro in Ofunwengbe, Ovia North East Local Government Area, Edo State, indicated that the soils in the area range from sandy loam to loamy sand, with an increase in clay content at deeper layers. The soil profile exhibited effective rooting depths greater than 90 cm and good drainage conditions, with no hardpan restrictions. Climatic factors including temperature, sunlight, humidity, and rainfall were generally favorable for oil palm cultivation, although the duration of dry months presented a slight limitation.

Despite these minor constraints, the study concluded that the area possesses high potential for oil palm production. To boost productivity, it was recommended that farmers adopt practices such as planting cover crops and applying organic matter (e.g., empty fruit bunches) to improve soil moisture retention during dry periods. Although the soil pH is adequate for nutrient absorption, challenges such as low effective cation exchange capacity (ECEC), nitrogen deficiency, and limited potassium availability can be mitigated through proper fertilizer application and efficient field management from planting to fruiting stages.

(vi) Environmental and Security Challenges

Adoption of innovation can be hinder due to insecurities , farmers may become displace, fear of going to their farm and inability of extension agents to visit due to crises in the community.

In the study "The Effect of Rural Banditry on Food Security in Nigeria: A Case of Ovia North East Local Government Area, Edo State", Amadasu and Etinosa highlight that tensions rooted in both historical and current cultural divides—such as ethnicity and religion—often stem from competition over scarce resources (Penu and Paalo, 2021). The International Crisis Group (2018) categorizes these resource-based disputes into conflicts like herders versus farmers, natives versus migrants, and even among herder groups themselves. When these social tensions become entangled with political affiliations, agricultural productivity often suffers (Paalo, 2020).

Agriculture's primary aim is to provide sufficient food to meet population dietary needs. However, recurring violent clashes particularly due to the seasonal migration of herders in search of grazing land and water have led to the deaths of many farmers and herders, alongside reduced crop and livestock output (Itemoagbo and Ebonine, 2022; Akerjiir, 2020).

(V) Cultural Resistance to Change

Cultural norms and traditional values can act as barriers to the adoption of new agricultural practices by smallholder oil palm farmers in Ovia North East.According to Zolkepi and Kamarulzaman (2015), an innovation that is not compatible with the values of smallholder farmers can inhibit the adoption of innovations.In Benin communities, strong social traditions influence daily life. Therefore, efforts to promote innovation—such as media campaigns—must align with these cultural values. Involving local leaders and respected influencers in awareness and education efforts can help improve acceptance and foster behavioral change.

(Xi) Poor Infrastructure

The absence of essential rural infrastructure—such as reliable roads, electricity, and storage facilities greatly undermines the success of innovation adoption. The World Bank (2008) notes that these deficiencies increase the cost of production and restrict farmers' access to markets, reducing the attractiveness of adopting new technologies.

(xii) Weak Market and Information Systems

A study conducted by (Konkwo et al., 2018) on Marketing information sources among oil palm fresh fruit bunch processors in Ovia Northeast Local Government Area, Edo State, Nigeria shows that poor marketing information limits proper adoption of innovation (Konkwo *et al*., 2018).

Numerous challenges impede the effective marketing of Fresh Fruit Bunches (FFB). Carrere (2010) emphasized that inadequate market information and poor quality control are major obstacles to FFB processing and product marketing.

Anyaoha et al. (2018) observed that most FFB processors in Africa rely on outdated and traditional methods, which fall short of international standards, particularly those used in countries like Malaysia and Indonesia. Zu et al. (2012) described these traditional techniques as labor-intensive and time-consuming, often leading to economic losses due to inefficient storage. A weak market and information on innovative ideas can hinder adoption of innovation by smallholders of oil palm in Ovia North East Local government Area, Edo State, Nigeria.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area and Scope

This study was carried out in Ovia North East Local Government Area of Edo State Nigeria, the Local Government Area comprises of communities / district which are; Okada, Adolor, Uhiere, Oghede, Uhen, Oluku, Utoka, Odighi, Ogbese, Egbeta, Okokhua, Ekiadolo with numerous villages. It is one of the seven local government areas of Edo South Agricultural Zones. The local government has it's headquartered at Okada. It has an area of 2,301 km² and a population of 153,849 (NBS, 2016). Male population of 80,433 and female population was 749,11. The local government Area which lie between Latitude 6° 33' to 7° 25' N and Longitude 5° 15' to 5° 37' E. It is located in lowland humid tropical zone of southern part of Nigeria in the rain forest zone with annual rainfall of 26ºc ,annual precipitation of between 1500-3500mm and a mean monthly temperature ranging between a minimum of 25.3°C and maximum of 28.2°C while relative humidity is high throughout the year with cloud cover. The high relative humidity is due to the proximity of the area to the ocean. This has made it favourable for the growth of oil palm. The major occupations of the people are farming and trading.

The study area is known for its fertile soil and favorable climate which make it suitable for agricultural production of crops. The farming system practiced by them

in the area is mixed and rotational farming system. They are involved in cultivation of crops such as cassava, cocoa, yams, plantain, cocoyam, oil palm, rubber and different types of fruits. There is social interaction and community involvement which is an important aspect and communal work as self-help project. These activities foster sense of cooperation. This interaction facilitates diffusion of innovation that should be adopt by the communities in Ovia North East Local Government Area.

3.2 Sampling Procedure and Size

Multiple stage sampling procedure was used to select respondents for the study.

Ovia North East Local Government Area was purposely selected due to its favourable ecological condition for the growth of oil palm and oil palm plantation /farming is a major source of income for smallholder's farmer of oil palm in the Local Government Area.

Stage 1: The Local government area was divided into three Agricultural zones, North, Central and Southern area to ensure representative coverage from each of the areas.

Stage 2: Six communities were randomly selected in the local government Area to ensure a fair representation of the entire Local Government Area.

Stage 3: Simple Random Sampling were used to select 20 farmers from each of the five selected communities, resulting in a total sample size of 120 respondents.

3.3 Method of Data Collection

A well-structured questionnaire was administered to each of the respondents for their responses and the completely filled questionnaire was collected and collated

3.4 Instrument for Data Collection

Data for the study was obtained through primary and secondary data sources.

The primary data was collected through structured questionnaire and designed to align with the study's objectives.

The secondary data was obtained from relevant literature and existing documents including textbooks, agricultural journals and bulletins, online sources and internet platforms.

3.5 Measurement of Variables

A. Socioeconomic characteristics

Sex: The respondents were asked to indicate their sex.

Male (1), female (2)

Age: The respondents were asked to select an age bracket between

<30 (1), 30-39 (2), 40-49 (3) >50(4)

Marital status: Respondents were asked to indicate their marital status from the options of single (1), married (2), divorced (3), and widowed (4).

Level of education: Respondents were asked to indicate their level of education. This was measured with the options of; No formal education (1), Primary education (2), Secondary education (3), and Tertiary education (4).

Household size: Respondents were asked to indicate their household size from the options listed below.

Less than 3 (1), 4-6 (2), 7-9 (3), above 10 (4).

Farming experience in years:

Respondents were asked to indicate years of experience from the following options: 1-5 years (1), 5-10 years (2), 11-15 years (3), above 15 years (4).

Membership in Farmer-Based Organization : Respondents were asked to welther they are members of any farmers associations. membership was measured as a dummy variables yes(1) / no (0)

Extension contact: Respondents were asked to indicate the frequency of annually visits from extension workers.

Less than 2 (1), 2-4 (2), 4-6 (3), above 6 (4).

Farm size (in hectare): Respondents were asked to indicate the size of their land in hectares.

1 – 3 hectares (1), 4 – 6 hectares (2), 7 - 9 hectares (3), above 10 hectares (4)

Annual income: Respondents were asked to indicate their annual income in Naira.

Below 500,000(1), 500,000 - 1 million (2), 1.1 million - 5 million (3), above 5 million Naira

B. To examine level of awareness of agricultural innovations by Smallholders' oil palm farmers of in the area

Respondents were asked to indicate the level of awareness and accessibility to Agricultural innovation provided to them from the agricultural extension services listed.indicating yes (1) , No (2)

i. Improved varieties of oil palm seedlings
ii. Use of machines or tools for harvesting
iii. Techniques for controlling pests and diseases
iv. Soil improvement methods (e.g., applying fertilizer, mulching)
v. Use of digital tools for farming (e.g., mobile apps, SMS updates)
vi. Access to weather prediction services
vii. Methods for adding value to oil palm products (e.g., processing, packaging)
viii. Availability of loans, grants, or input support

C. To examine Farmers information sources on oil palm technologies

Respondents were asked to indicate the sources of Innovations -related information used by them indicating yes (1), No (0)

- Agricultural extension agents
- Radio/Television programs

- Fellow farmers/Peer learning
- Farmer associations/Cooperatives
- Online platforms (social media, apps)
- NGOs/Donor programs
- Input dealers

D. To ascertain the level of adoption of innovation

Respondents were asked to indicate their level of adoption to the statement listed below . Using the Likert-type scale 1-5.

(1 = very high, 2 = High, 3 = Low, 4 = very low 5 = Not at all.

I. Regularly use of mechanized farming techniques

II. Use Agrochemicals (fertilizer)

III. Regular participate in training and retraining

IV. Use of improved oil palm seedlings.

V. Regular use of ICT -based farming tools

VI. Use of weather information

VII. Use of Pest and disease control technique

VIII. Contacts with extension agents.

E. To examine motivations for farmers' adoption of oilpalm technologies

Respondents were asked to indicate what motivated them to adopt oil palm innovations. Indicating reason (1) , Not a reason (0)

- Higher income
- Better crop yields
- Availability of training or knowledge
- Influence from fellow farmers
- Support or incentives from government/NGOs

F. Constraints affecting the adoption of innovations

Respondents were be asked to indicate the extent to which the listed constraints affect the level of adoption. Indicating a yes (1) / No (0)

i. Limited awareness
ii. High cost of adopting innovations
iii. Insufficient access to credit
iv. Weak extension services
v. Difficulty accessing innovations
vi. Inadequate training opportunities
vii. Fear of crop failure
viii. Cultural or traditional opposition

3.5 Data Analysis

Data collection for the study was analyzed using descriptive and Inferential statistical methods.

Objective 1: The socioeconomic characteristics of the respondents was analyzed using descriptive statistical methods, including: frequency distribution and, percentage calculations.

Objective 2: The level of awareness of agricultural innovations by respondents was determined using frequency distribution and percentage calculations.

Objective 3: Information sources on oil palm innovations by smallholders of oil palm in Ovia North East Local Government Area to respondents was analyzed using frequency distribution.

Objective 4: The level of adoption of innovation was determined using frequency percentage calculation , mean scores and standard deviation.

Objective **5:** The motivations for farmers' adoption of oil palm innovations by respondents was determined using mean and standard deviation.

Objective 6: The constraints affecting the adoption of the innovations was determined using mean scores and standard deviation.

Test of Hypotheses:

The hypotheses of this study was tested with multiple regression analysis respectively.

Multiple regression analysis was employed in this study as it enables the assessment of how multiple independent variables collectively impact a single dependent

variable.

Formula for general multiple regression

$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ...+ \beta_n X_n + U_t$

Where;

Y: is dependent variable

X: Represent independent variable causing a change in Y. It is important to know that each X Factor represents distinct predictive.

β_0 represent intercept. Y- value when all the independent variable X_1 through X_2 are equal to Zero. (Baseline the level of adoption of innovation when all the X Factor are not influencing adoption).

U_t: represent the error term or disturbance of the unobserved random component that affect dependent variable(Y).

The variable β_1 .... β_n represent regression coefficient.

Significance will be tested at 5% ($p < 0.05$)

Hypothesis 1

H_{01}: There is no significant relationship between farmers' socio-economic characteristics and the adoption of agricultural innovations.

Measurement of variable

Multiple regression formula: $Y= \beta_0 + \beta_1 + X_1 + \beta_2 X_2 + ...+ \beta_n X_n + U_t$

$$Y= \beta_0+ \beta_1 X_1+ \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + U_t$$

Dependent variable (Y) = Adoption of innovation

Independent variable X_1 - X_9

Sex	=	X_1
Age.	=	X_2
Educational level	=	X_3
Household size.	=	X_4
Farming experience	=	X_5
Farming size	=	X_6
Membership of farmer organization	=	X_7
Annual income	=	X_8
Access to agricultural extension services	=	X_9
Awareness of agricultural innovations	=	X_{10}

CHAPTER FOUR

4.0 RESULTS

4.1 Socio-economic Characteristics of the Respondents

4.1.1 Sex

Table 4.1 show that the majority (63.33%) of the oil palm farmers were male, while 36.67% were female. This implies that oil palm farming in the Ovia North East local government Area, Edo state is predominantly male-dominated. This findings align with Oyegbami et al., (2023) emphasis that agricultural enterprises requiring substantial capital investment and land ownership, such as tree crop cultivation, are often dominated by men due to socio-cultural norms and inheritance patterns that favor male access to productive resources while women have limited access to them.

4.1.2 Age

Table 4.1 reveal that 34.17% of the respondents were within the 40–49 years age bracket, while (33.33% /were aged 30–39 years. Furthermore, 17.50% were 50 years and above, and 15% were below 30 years. This implies that most of the farmers fall within the economically active age group, suggesting that they are energetic, actively involved in farming, and have can possibly have a more probability of being interested in adopting innovative agricultural practices and technologiesThis findings agrees with Oyesola, et al, 2011).

4.1.3 Marital Status

Table indicate that (50%) of the respondents were married, while 24.17% were single, 17.50% divorced, and 8.33% widowed. This distribution suggests diverse household structures within the farming community. The high percentage of married farmers shows the potential importance of family labor in farming operations. This align with Njuki et al., (2022) who emphasized that marital status significantly influences availability of labour and resource allocation decisions in smallholder agricultural households.

Table 4.1: Socio-economic characteristics of respondents

Characteristics		Freq	%
Sex	Female	44	36.67
	Male	76	63.33
Age (years)	Below 30	18	15.00
	30-39	40	33.33
	40-49	41	34.17
	50 & above	21	17.50
Marital status	Single	29	24.17
	Married	60	50.00
	Divorced	21	17.50
	Widowed	10	8.33
Educational level	No formal education	50	41.67
	Primary	28	23.33
	Secondary	27	22.50
	Tertiary	15	12.50
household size	3 & below	46	38.33
	4-6	53	44.17
	7-9	21	17.50
years of farming experience	<5	44	36.67
	5-10	47	39.17
	11-15	22	18.33
	>15	7	5.83
farm size (ha)	1-3	85	70.83
	4-6	33	27.50
	7-9	2	1.67
main source of income	Farming	73	60.83
	Trading	32	26.67
	Civil service	15	12.50
membership of farm organization	No	64	53.33
	Yes	56	46.67
access to the agricultural extension service	<=1	102	85.00
	2-4	16	13.33
	4-6	2	1.67
annual income (NGN)	<500,000	71	59.17
	500,000-1,000,000	47	39.17

	1M - 5M	2	1.67

Source: Field survey, 2025

4.1.4 Educational Level

A significant finding shows that (41.67%) of respondents had no formal education, 23.33% had primary education,(22.50%) secondary while few (12.50%) had tertiary education. This high level of illiteracy presents a major challenge to modern agriculture.This finding agrees with Asadullah and Maliki (2023) who reported that education significantly enhances farmers' ability to process technical information and adopt improved agricultural practices, with low educational levels being a critical barrier to technology adoption.

4.1.5 Household Size

The results show that 44.17%of households had 4-6 members, while 38.33% had 3 or fewer members. This indicates moderate household sizes that could provide adequate family labor for farming operations. This finding is supported by Ojo and Baiyegunhi (2023) who found that medium-sized households often strike a balance between labor availability and consumption demands, making them potentially more productive in agricultural activities.

4.1.6 Years of Farming Experience

The results from the table shows that,(39.17%) of respondents had 5–10 years of farming experience, (36.67%) had less than 5 years, while (18.33%) and(5.83%) had 11–15 years and over 15 years, This implies that respondents in this areas have a fair farming experiences based on their numbers of years in oil palm farming..However, only(5.83%)had more than 15 years of experience. This finding

agrees with Adediran, et al, (2020). Farmers' experience influence their adoption of new practices and risk management that will be profitable to them .

4.1.7 Farm Size

The results show that 70.83%of farmers cultivated small plots of 1-3 hectares, 27.50% cultivate on 4-6 hectare and 1.67% cultivate on 7-9 hectares..classifying them as smallholder farmers. This finding is consistent with Giller et al. (2023) who found that,small landholdings is a fundamental characteristic of African agriculture that hinders economies of scale and limits investment capacity among smallholder farmers.

4.1.8 Main Source of Income

From the results main source of income by the smallholders' oil palm farmers in Ovia North East , Local government Area Edo state are: 60.83% main source of income is farming ,26.67% is trading and 12.50% is civil services.

Farming was the main source of income for 60.83%of respondents, indicating heavy reliance on agriculture for livelihoods. This finding agrees with Djurfeldt (2023) who emphasized that for most smallholder farmers in Africa, agriculture remains the primary livelihood strategy, making them highly vulnerable to agricultural shocks but also strongly motivated to adopt innovations that can improve their income.

4.1.9 Membership of Farm Organisation

The results show that 53.33%of respondents did not belong to any farm organization, while 46.67% were members. This near-equal split highlights the potential for improving collective action among farmers. This finding is supported by Shumeta and D'Haese (2023) who demonstrated that farmer cooperatives significantly enhance access to information, credit, and markets, thereby promoting technology adoption among members.

4.1.10 Access to Agricultural Extension Service

Table 4.1 reveals that the majority (85.00%) of the respondents had very limited access to agricultural extension services, with only one or fewer contacts per year. About 13.33% of farmers reported having between two to four extension contacts annually, while only 1.67% had between four to six contacts. This indicates a severe gap in agricultural knowledge transfer and technical support among smallholder oil palm farmers in the study area. The finding aligns with Spielman et al. (2023), who emphasized that inadequate extension contact remains a major constraint to technology adoption among smallholder farmers in developing countries.

4.1.11 Annual income

From the table 4.1. Most smallholders' oil palm farmers in Ovia North East local government Area, Edo state, Nigeria earn less than 500,000 naira annually (59.17%) and another (39.17%)earn between 500,0000 and 1m Naira; (1.67%)earn above 1 m naira .

The results reveal that (59.17%) of farmers earned less than ₦500,000 annually, indicating prevalent low income levels among respondents. This finding aligns with Adade, et al., (2020).who found that low income and liquidity constraints as major constraints to agricultural innovation adoption among smallholder farmers in Nigeria, hinders their capacity to acquire improved inputs and technologies or new innovative ideas..

4.2 Level of awareness of Agricultural Innovations

Table 4.2 shows the level of awareness of Agricultural innovations by farmers.

The results shows that majority of the farmers are aware of techniques for controlling pest and disease (98.33%) , soil improvement method such as the fertilizer application, mulching practices (93.33%), .This indicate that the famers are highly aware of traditional methods of soil management practices.Awareness of Improved varieties of oil palm seedlings at (87.50%) and value addition method (85.00%) suggest that farmers are aware of the role that can possibly boast productivity and increase crop ouput.

However, 53.33% are aware of the use of machine or tools /equipment for harvesting , awareness of weather prediction service (37.50%), Awareness of availability of loans /grant (36.67%) and (62.50%) are not aware and awareness of digital tools such use mobile update is (43.17%). The low awareness of ICT based

farming tools and weather prediction reflect the limited awareness of modern agricultural technologies.

This study agrees with the finding of Gere , et al. (2020) found that farmers' Adoption of innovation depends on how much they know about an innovation and how beneficial they believe in them. Peter (2022), found that Smallholders' farmers are more aware of traditional farming practices of oil palm than modern agricultural technologies

Table 4.2: Level of awareness of agricultural innovations by respondents

	Aware		Not aware	
Awareness	**Freq**	**%**	**Freq**	**%**
Technique for controlling pest and diseases	118	98.33	2	1.67
Soil improvement methods e.g fertilizer, mulching	112	93.33	8	6.67
Improved varieties of oil palm seedlings	105	87.50	15	12.50
Methods of adding value to oil palm product	102	85.00	18	15.00
Use of machine or tools for harvesting	64	53.33	56	46.67
Access to weather prediction services	45	37.50	75	62.50
Availability of loans, grant, input supports	44	36.67	76	63.33
Use of digital tools for farming e.g mobile app, sms updates	41	34.17	79	65.83

Source: Field survey, 2025

4.3 Major Sources of Innovation-Related Information

Table 4.3 show that, the Major sources of innovation - related information of oil palm by smallholder oil palm farmers in Ovia North East local government Area, Edo state .It indicates that majorityof smallholders oil palm farmers in Ovia North local government Area Edo state obtains innovation - related information from fellow farmers/peer pressure (94.17%) , this refects the influence of social interactions in diffusion of information, (83.33%) depends on radio / television programs.this reflect the influence of mass media in the adopt of innovations by rural communities. Other sources of innovation related information by smallholders oil palm farmers in this area are farmer association/corporative (49.17%) , input dealer(30.38%), NGO'S/ donor programs (24.17%) an agricultural extension service agents (20.88%) this indicate weak or limited extension visit. And (20.17%) accesses oil palm related information Online platform such as social media, Apps. This reflect low awareness with the use of digital tools to obtain oil palm innovation -related information. This findings agrees with Rogers (2003) which emphasis important influence interpersonal relationships/ interactions have in diffusion of innovation (Nwachukwu *et al.,* 2019) suggests that radio is effective in disseminate of information in rural communities.

Table 4.3: Major information sources on agricultural innovations

	Yes		No	
Sources	**Freq**	**%**	**Freq**	**%**
Fellow farmers/peers learning	113	94.17	7	5.83
Radio/television programme	100	83.33	20	16.67
Farmers association/ cooperatives	59	49.17	61	50.83
Input dealers	37	30.83	83	69.17
NGO'S/Donor programs	29	24.17	91	75.83
Agricultural extension service agents	25	20.83	95	79.17
Online platforms (social media, apps)	24	20.17	95	79.83

Source: Field survey, 2025

4.4 Adoption behaviour of Respondents

This result in table 4.4 shows the past innovations' respondents had utilized as well as examined their current adoption behaviour.

4.4.1 Innovations Utilized before by Respondents

The results in Table 4.4 .Shows that majority of respondents from the area had previously adopted fertilizer/soil enhancement (90.83%) and pest and disease control (90.00%) this findings suggest that this innovation had been acknowledged by the farmers and used by them due to it effectiveness which boasted crop yields and increase the farmers income. This finding agrees with the work of Urhibo, et al. (2020). About (65.00%) adopted improved oil palm seedlings this indicate that

respondents moderate adoption of improved oil palm seedlings. This can be due to limited access to improved seedlings or cost implications.

However, the adoption of Mechanized harvesting equipment at (17.50%) and mobile agricultural application (12.50%) are relatively low. This suggest that, smallholders oil palm farmers in this area are more into the practice of conventional farming than modern agricultural technological adoption due to high cost of equipment or access to it. This findings agrees with the work of Ikuobase, Alakpa *et al* (2025). emphasis that smallholders farmers find it difficult to adopt modern agricultural innovations due to the cost implications and and access to it.

Table 4.4: Agricultural innovations used before by respondents

	Adopted		**Not adopted**	
Innovations	**Freq**	**%**	**Freq**	**%**
Fertilizer/ soil enhancement	109	90.83	11	9.17
Pest and disease control chemical	108	90.00	12	10.00
Improved oil palm seedlings	78	65.00	42	35.00
Mechanized harvesting equipment	21	17.50	99	82.50
Mobile agricultural application	15	12.50	105	87.50

Source: Field survey, 2025

4.4.2 Level of Adoption of Innovation

The result from table 4.5 shows that majority of smallholder oil palm farmers adopt agrochemical e.g fertilizer ($\underline{x}$=3.33), pest and disease control technique ($\underline{x}$=3.18), Improved oil palm seedlings which adoption is at moderate level.This suggest that the respondent adopt innovations that directly contribute to crop yields and increases the income obtain from oil palm farming.

However, ICT-based farming tools ($\underline{x}$= 1.45) , mechanized harvesting techniques ($\underline{x}$=1.35) which adoption is at low level and weather information ($\underline{X}$=1.25) which adoption is very low level .This findings shows that adoption of modern technological innovations remaining very low among smallholders oil palm farmers in Ovia North East local government, Edo state Nigeria. This findings aligns with the work of Ikuobase, et al., (2025).which emphasis that famers in rural communities adopt traditional farming practices while the acceptance and adoption of Mechanized or modern agricultural technologies remains low.

Table 4.5: Innovation adoption by respondents

Innovations	Mean	SD
Agrochemical e.g fertilizer	3.33	0.901
Pest and disease control technique	3.18	0.830
Improved oil palm seedlings	2.60	1.286
ICT-based farming tools e.g mobile apps	1.45	0.995
Mechanized harvesting techniques	1.35	0.941
Weather information	1.25	0.638

Source: Field survey, 2025

4.6 Motivations for Respondents Adoption Behaviour

The results in table 4.6 shows that (100 %) of respondents adopt innovation mainly because high income obtained from oil palm farming, while the influence from fellow farmers (99.17%) and better crop yields(98.32%) of This shows that interpersonal relationships among farmer in a communal society have great influence on farmers in the adoption of agricultural innovation.

Furthermore, majority of smallholder oil palm farmers in Ovia North East local government Area Edo state, adoption innovation due to availability of knowledge (85%) they acquired which implies that available of technical information plays important role in adoption of innovation. However, few respondents adopt oil palm innovations due NGO'S / support or incentives from government agencies (27.50%) . This suggest that, the farmer have limited support from government and NGO'S

The study agrees with the work of Gere et al. (2020), which emphasis that ,that farmers are motivated by the financial profit the will obtain from the farm works and the influence the received from fellow farmers affect their adoption behavior.

Table 4.6: Respondents reasons for adopting oil palm innovations

	A reason		Not a reason	
Constraints	**Freq**	**%**	**Freq**	**%**
High income	120	100.00	0	.00
Influence from fellow farmers	119	99.17	1	.83
Better crop yield	117	98.32	2	1.68
Availability of training or knowledge	102	85.00	18	15.00
Support or incentives from Government or NGO	33	27.50	87	72.50

Source: Field survey, 2025

4.7 Adoption Constraints faced by smallholders oil palm farmers

The results in table 4.7 reveals that, the major constraint to oil palm farmers in Ovia North East local government Area is high cost of adopting innovations (99.17%),in sufficient access to credit(98.33%),The suggest that ,lack of finance serve at a barrier to adoption of improved agricultural innovations by smallholder oil palm farmers in Ovia North East local government area ,Edo state

Other challenges are weak extension services (95.00%), inadequate training opportunity (95.00%) this implies that the respondents are greatly affect by lack of proper information or timely advisory services on innovations and demonstrations of how best to use certain agricultural technologies are not provided because of weak extension contact thereby posing a great challenge in the adoption of innovations among the farmers.

Further more , fear of crop failure (95.00%),This implies that some farmers do not want to take the risk of trying new agricultural technologies / information because the lack assurance about It effectiveness that can possibly increase the productivity of their crop. Difficulty in assessing innovation (91.67%), limited awareness (82.50%) and cultural or traditional opposition(74.79%) which is the least. This implies that some respondents are affected by culture barriers, such as norms and belief in this region.

This study agrees with the finds of Onoh (2022) and Oyegbami *et al.,* (2023) which emphasis that, poor extension contacts, lack of awareness of innovations , inadequate training opportunities are constraints to adoption of innovations by smallholders farmers.

Table 4.7: Adoption Constraints faced by Respondents

	Yes		No	
Constraints	**Freq**	**%**	**Freq**	**%**
High cost of adopting innovations	119	99.17	1	.83
Insufficient access to credit	118	98.33	2	1.67
Weak extension services	114	95.00	6	5.00
Inadequate training opportunity	114	95.00	6	5.00
Fear of crop failure	114	95.00	6	5.00
difficulty in accessing innovation	110	91.67	10	8.33
Limited awareness	99	82.50	21	17.50
Cultural or tradition opposition	89	74.79	30	25.21

Source: Field survey, 2025

4.8. Hypothesis

Regression estimates of socio-economic factors influencing adoption of oil palm innovations by Smallholders' oil palm farmers.

Table 4.8 shows the relationship between the farmer socioeconomic characteristics.

The multiple regression estimates results in table 4.8 shows that, the model was significant at 5% level ($F = 7.23$; $p < 0.05$) with an Adjusted R^2 of 0.345, indicating that about 34.5% of the variation in the adoption level of smallholders oil palm farmers in Ovia North East local government area Edo state is explained by socioeconomic characteristics included in this model.This implies that the

independent variable variables have joint influence in the adoption of innovation by smallholders farmers in this region.

Among the independent variables are Annual income (p= 0.0005), agricultural extension services (p= 0.000) awareness of innovations(0.004) were significant and have a positive influence in the adoption of innovation by smallholders oil farmers this area.

This results suggest that farmers with annual income (β = 0.275) who are high income earners adopt innovations because the can afford certain agricultural input /services morethan the low income earners .Agricultural extension services (β = 0.382)this implies that farmers who have extension contacts adopt agricultural innovation because the have proper informations and demonstrations by extension agents.

However, variables such as sex (β = 0.123),age (β =- 0.034) educational level (β =0.008), household sizes (β =-0.062) ,year of farming experience (β =-0.132), farm size (β = 0.025)membership of farmer organization (β = 0.116) were not statistically significant (p>0.05) I.e the have little influence in adopt of agricultural innovations . The variables such age and farming experience suggest that older people tend to be less interested in adopting new oil palm innovations due to their conservative practices.

This findings agrees with work of Ikuobase et al, (2025) and (Urhibo *et al.,* (2020), who emphasis that, the income earned by farmers, extension contacts and awareness about new innovationd have significant impact in the adoption of innovation by smallholders oil palm farmers in Edo state.

Table 4.8: Regression estimates of the socioeconomic factors influencing farmers' adoption

Independent variables	Coefficient	SE	Beta coefficient	t value	Prob. Level
(Constant)	7.158	1.6		4.52	0.000
Sex	0.984	0.7	0.123	1.37	0.172
Age	-0.138	0.5	-0.034	0.28	0.779
Educational level	0.026	0.3	0.008	0.10	0.924
Household size	-0.331	0.5	-0.062	0.63	0.528
Years of farming experience	-0.577	0.6	-0.132	0.97	0.333
Farm size	0.195	0.7	0.025	0.27	0.785
Membership of farm organization	0.898	0.7	0.116	1.34	0.182
Annual income*	2.017	0.7	0.275	2.87	0.005
Access to agric extension service*	3.558	0.8	0.382	4.53	0.000
Awareness of Innovations (total)*	0.571	0.2	0.249	2.98	0.004

F value = 7.23; p<0.05*, *Adjusted R square = 0.345

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of findings

This study assessed the adoption of Innovations by smallholders' oil palm farmers in Ovia North East local government area Edo State, Nigeria. The specific objectives of this study were to : determine the socioeconomic characteristics of smallholder oil palm farmers in Ovia North East Local Government Area, Edo State , identify the agricultural innovations smallholder oil palm farmers are aware of in the area, ascertain the level of adoption of the innovations by smallholders oil palm farmers in the area, Examine the farmers information sources on oil palm innovations ,examine motivations for farmers' adoption of oilpalm technologies and identify constraints affecting the adoption of the innovations among smallholder oil palm farmers' in Ovia North East local government.

This study was conducted in Ovia North East LGA using Multiple stage sampling procedure to select 120 Smallholders' oil palm farmers across six purposively selected communities in the local government Area. The data for this study was collected using a structured questionnaire, and the descriptive statistic (frequency, means, percentage, standard deviation) Likert scale anaysis and multiple regression were used to analyze the data.

This findings revealed that, Smallholders' oil palm farmers were dominated by male (63.33%), with majority of the farmers were within economical active age 30-49 years (67.50%). The results indicate that half(50%) of the respondents were married suggesting availability of family labour.

Educational level is low as majority had no formal education (41.67%) suggesting that this can limit the technical understanding and assimilation of information regarding adoption of oil palm Innovations. Respondents having a household size (44.17%) had 4-6 members which have the potential of providing adequate family labour that facilitates division of labour among family members. About (75.84%) had less than 11 years of farming experiences while 70.83% cultivate on a farm size between 1-3 hectares of land. The main source of income of 60.83% of respondents was farming, this shows that majority of respondents in this region rely on agriculture as their main source of livelihood. Furthermore, 46.67% members of farmers association while, 53.33% are not. This suggest that, this can create atmosphere for awareness of Innovations among the farmers (85%) of respondents have little or no contacts with extension agents per year, this serves as a major constraint to technical support and appropriate practices of Innovations by the respondents. Finally (59.17%) of respondents earned ₦500,000- ₦1,000000 annually. This suggest that low income level of farmers can hinder adoption of Innovations.

This study assessed the level of awareness of innovations among oil palm farmers, the result shows that farmers were highly aware of pest and disease control and soil improvement technique. Moderately aware of improved oil palm seedlings and value addition such as packaging, few was aware of Mechanized harvesting tools, use of mobile App and weather predictive information. Farmer's main source of information were obtained from fellow farmers, radio/ Television, few farmers obtained agricultural innovation- related information from NGO'S, inputs dealers, extension agents and online App's.

The motivations for farmers' adoption of oil palm Innovations were high due to the higher income, better crop yields, availability of knowledge while few of the respondents were motivated by supports from NGO and government agencies.

Majority constraints faced by smallholders oil palm farmers in this region is high cost of adopting innovations (99.17%), insufficient access to credit (98.33), limited extension services (95%), inadequate training opportunity (95%), fear of crop failures (95.%), difficulty in accessing innovations(91%), limited awareness(82.50%) and cultural barrier (74.79%) have minimal impact in the adoption of oil palm innovations among respondents.

The regression analysis revealed that, there is no significant relationship between most of the socioeconomic characteristics except for annual income, access to

extension services and awareness which significantly affect the adoption of agricultural Innovations among smallholders' oil palm farmers.

5.2 Conclusion

Based on this finding, the following conclusions were drawn.

1. Adoption of oil palm innovations among smallholders' oil palm farmers in Ovia North East local government area Edo state, heavily rely on the economic and information factors rather than socioeconomic characteristics such as age, sex, level of education which have little or no significant on adoption of Innovations.
2. Farmers with high income, extension contacts are more aware agricultural innovation and adopt improved farming practices faster.
3. The study identifies that farmers who received extension services, NGO'S and government support shows a higher level of adopting agricultural innovations.
4. This study also shows that awareness of agricultural innovations has great impacts on the adoption of Innovations among smallholders' oil palm farmers as farmers who are informed have more tendency of adopting improved agricultural practices.
5. The overall, access to extension services and inadequate awareness of agricultural innovations are major constraints of adoption of improved

agricultural practices. This emphasis the need for improved information systems among smallholders' oil palm farmers. However, smallholders' farmers still faced other challenges such as insufficient financial resources, limited access to land and cultural barriers

5.3 Recommendations

Based of the findings and conclusion the following recommendations were made to improve the level of adoption of oil palm innovations by smallholders oil palm farmers' in Ovia North East local government area, Edo state, Nigeria.

- Smallholders oil palm farmers should be provided with adequate training opportunities which should be monitored and evaluated by appropriate agencies inotder to improve the level of adoption of new improved practices such as standard quantity of fertilizer application, mulching, pest and disease control which can boast productivity in oil palm farming.
- Access to extension service outreach should be intensify to motivate and inform smallholders oil palm farmers to adopt agricultural innovation in this region as this will help to create awareness of improved agricultural innovations and bridge the gap between farmers and extension agents.
- Government policy and bodies such as NIFOR should aimed at the sustainability of oil palm farming, improved environmental security to avoid

farmers displacement and not only policies based on increase in oil palm production.

- Efforts should be made to bridge smallholders oil palm farmers with oil palm processors and buyers. This can be facilitates through contact farming, as this encourage farmers to adopt improved agronomical innovations that will increase crop yields and income level.
- Smallholder oil palm farmers should be introduced to technological tools that have less cost implications and can be readily implement with assurance of positive effectiveness of the tools or practices in order to eliminate the fear of crop failure and unnecessary risk.
- Smallholders oil palm in this region should be Provide with credit facilities with low interest rate by cooperative society, Agricultural banks, microfinance bank and support from government programs as this will help them to procure improved oil palm seedlings like tenera and other improved agronomical innovations that contributes to a better standard of living and agricultural sectors as a whole in Edo state.

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

Dear Sir/Madam,

REQUEST FOR ADMINISTRATION OF QUESTIONNAIRE

I am a final year student of the above named institution. I am carrying out research on the topic "adoption of innovation by smallholders' oil palm farmers' in Ovia North East Local Government Area, Edo State, Nigeria" and solicit your assistance by responding to the questions accurately. Be assured that all information given will be specifically used for academic purpose and will be treated as confidential.

Thanks for your anticipated cooperation.

Adakole Blessing Onyayege

Section A: Socioeconomic characteristics

To determine the socioeconomic characteristics of smallholder oil palm farmers)

1. Sex ( ) Male ( )Female
2. Age Category: ( )Below 30 ( ) 30–39 ( ) 40–49 ( ) 50 and above
3. Marital Status: ( )Single ( ) Married ( ) Divorced ( )Widowed
4. Educational Level: ( )No formal education ( )Primary ( ) Secondary ( )Tertiary ( )Others: _____
5. Household Size (number of dependents): < 3 ( ), 4-6 ( ), 7-9 ( ), above 10 ( ).
6. Years of Farming Experience: ( )<5 ( ) 5–10 ( )11–15 ( ) >15
7. Farm Size (in hectares): 1–3 hectares ( ), 4 – 6 hectares ( ), 7 - 9 hectares ( ), above 10 hectares ( )

8. Main Source of Income: ( )Farming ( ) Trading ( ) Civil service ( ) Other: _____
9. Membership in Farmer-Based Organization (FBO)/Cooperative Society: ( ) Yes ( ) No

If yes, state the name: _____

10. Access to Agricultural Extension Services(per year):( ) Less than 1 ( ) 2-4 ( )4-6 ( ) 6 above

11.Annual income income from farm: (.) 500,000 ,( ) 500,000 -1M ( ) 1 -5M ,( )5 million above.

SECTION B:AWARENESS OF AGRICULTURAL INNOVATIONS.

farmers)

12. Are you aware of any agricultural innovations for oil palm production?

( ) Yes ( ) No

13. Which of the following agricultural innovations are you aware of or have access to? (Tick all that apply)

- Improved varieties of oil palm seedlings( )
- Use of machines or tools for harvesting( )
- Techniques for controlling pests and diseases( )
- Soil improvement methods (e.g., applying fertilizer, mulching ( )
- Use of digital tools for farming (e.g., mobile apps, SMS updates ( )
- Access to weather prediction services ( )
- Methods for adding value to oil palm products (e.g., processing, packaging). ( )
- Availability of loans, grants, or input support. ( )
- Other innovations (please specify): _____

C.FARMERS INFORMATION SOURCES ON OIL PALM INNOVATIONS

14. What are your major sources of innovation-related information? Tick all that apply.

- Agricultural extension agents ( )
- Radio/Television programs ( )
- Fellow farmers/Peer learning ( )
- Farmer associations/Cooperatives ( )
- Online platforms (social media, apps) ( )
- NGOs/Donor programs ( )
- Input dealers ( )

SECTION D :EVEL OF ADOPTION of INNOVATION

15 . Please indicate which innovations you have used in the past years.

(Yes/No)

Innovation type	Yes	No
Improved oil palm seedlings		
Mechanize harvesting equipment		
Pest and disease control chemical		
Fertilizer / soil amendment		
Mobile agricultural application		

16. On a scale of 1 to 5, indicate you adoption level for each of the following Innovation .
| 1] very High| 2 |High [3] Low | 4 | very long [5] Not at all

Innovation	**Very High 1**	**High 2**	**Low 3**	**Very low 4**	**Not at all 5**
I use Mechanized harvesting techniques					
I use of agrochemicals					
I regularly participation in training					
I used Improved oil seedlings					
I regularly use ICT-based farming tools.					
Weather information					
Pest and disease control technique					
Contacts with extension agents					

E.MOTIVATION FOR FARMERS' ADOPTION OF OIL INNOVATIONS

17. What reason have motivated you to adopt the innovations? (Select all that apply)

- Higher income ( )
- Better crop yields ( )
- Availability of training or knowledge ( )
- Influence from fellow farmers ( )
- Support or incentives from government/NGOs ( )
- Other (please specify): _____"

SECTION F: CONSTRAINTS TO ADOPTION OF INNOVATION

18. Have you faced any difficulties in adopting innovations? ( ) Yes ( )No

If yes, please describe:

If yes, what are the key barriers? (You may select more than one)

- Limited awareness ( )
- High cost of adopting innovations ( )
- Insufficient access to credit ( )
- Weak extension services ( )
- Difficulty accessing innovations ( )

- Inadequate training opportunities ( )
- Fear of crop failure ( )
- Cultural or traditional opposition ( )
- Other (please specify): _____

19. In your opinion, what strategies do you believe would contribute to increase in the adoption of innovations among oil palm farmers?

_____

_____