

**ADOPTION OF IMPROVED TECHNOLOGIES BY POULTRY FARMERS IN OVIA  
NORTH-EAST LOCAL GOVERNMENT AREA OF EDO STATE, NIGERIA**

**BY**

**Miracle JOHNSON-OKIEMUTE  
AGR1900037**

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

**MARCH, 2025**

**ADOPTION OF IMPROVED TECHNOLOGIES BY POULTRY FARMERS IN OVIA  
NORTH-EAST LOCAL GOVERNMENT AREA OF EDO STATE, NIGERIA**

**BY**

**Miracle JOHNSON-OKIEMUTE  
AGR1900037**

**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)**

**MARCH, 2025**

## CERTIFICATION

This is to certify that the research work on the Adoption of Improved Technologies by Poultry Farmers in Ovia-North East Local Government Area of Edo State was carried out by Miracle JOHNSON-OKIEMUTE with the Mat. No AGR1900037 under the supervision of the department of Agricultural Economics and Extension Services, Faculty of Agriculture, University of Benin, Edo State, Nigeria.

\_\_\_\_\_  
**Mr. A. O. Ehigie**  
Project Supervisor

**Date:** \_\_\_\_\_

\_\_\_\_\_  
**Prof. Mrs. M.J. Koyenikan**  
Head of Department

**Date:** \_\_\_\_\_

## **DEDICATION**

This research work is dedicated to the Almighty God who in his infinite mercy, sustained, favoured and strengthened me all through this period.

## ACKNOWLEDGEMENTS

I sincerely appreciate the ever great God for seeing me through my undergraduate degree in this ever green Faculty of Agriculture, University of Benin and also for his sustaining grace during the cause of this research.

With a heart filled with immense joy, I also thank my supervisor Mr. A. O. Ehigie for his unending contributions through his immense teachings, errors correction and guidance towards achieving an excellent work. I also appreciate the Head of Department, Prof. (Mrs) M.J. Koyenikan, Dean of Faculty of Agriculture (Prof. C. Emokaro), course adviser, Mrs. Sharon Okundaye, and other lecturers (Miss Osayi Emokpae, Dr. Eweka, and Dr. (Mrs) Izekor, Dr. Igbinidu, etc), who had imparted me with knowledge as concerning this profession.

My special appreciation goes to my parents, Mr. and Mrs. Okiemute Johnson for their constant prayers and advices and most especially their financial support during the years of my studies, and also to my Siblings for their unending support so far.

I appreciate greatly my special friends; Edwin AGBONGIAYANYI, Godwin OSEZUA, Rukewe EFIAKPOWORIE, and some others, their constant love, support and care have been of great significance, and I also thank the entire graduating class of 2024.

Lastly, I also want to specially acknowledge my very own special co-project students, Miss Felicity Blessing IKUBOR and Miss Linda Chidinma MBAKPUO for their encouragement and support in every aspect that relates to the completion of this project work. May God continue to bless them.

## TABLE OF CONTENTS

Cover Page	-	-	-	-	-	-	-	-	-	i
Title Page	-	-	-	-	-	-	-	-	-	ii
Certification	-	-	-	-	-	-	-	-	-	iii
Dedication	-	-	-	-	-	-	-	-	-	iv
Acknowledgement	-	-	-	-	-	-	-	-	-	v
Table of Contents	-	-	-	-	-	-	-	-	-	vi
List of Tables	-	-	-	-	-	-	-	-	-	ix
Abstract	-	-	-	-	-	-	-	-	-	x

### CHAPTER ONE

1.0 INTRODUCTION	-	-	-	-	-	-	-	-	-	1
1.1 Background of the Study	-	-	-	-	-	-	-	-	-	1
1.2 Research problem Statement	-	-	-	-	-	-	-	-	-	3
1.3 Objectives of the Study	-	-	-	-	-	-	-	-	-	4
1.4 Justification of the Study	-	-	-	-	-	-	-	-	-	5
1.5 Hypotheses of the Study-	-	-	-	-	-	-	-	-	-	6

### CHAPTER TWO

2.0 LITERATURE REVIEW	-	-	-	-	-	-	-	-	-	7
2.1 Overview of Poultry farming in Nigeria	-	-	-	-	-	-	-	-	-	7
2.2 Socio-Economic Characteristics of Poultry Farmers in Nigeria	-	-	-	-	-	-	-	-	-	11
2.3 Awareness of Poultry Farming Technologies	-	-	-	-	-	-	-	-	-	12
2.4 Definition of Technology	-	-	-	-	-	-	-	-	-	12

2.5	Diffusion of Innovation Theory (DOI)	-	-	-	-	13
2.6	Technology Acceptance Model (TAM)	-	-	-	-	14
2.7	Improved Poultry Technologies in Nigeria	-	-	-	-	16
2.8	Awareness and Information Sources	-	-	-	-	22
2.9	Factors Influencing the Adoption of Improved Poultry Technologies-					23
2.10	Perceived Benefits of Poultry Farming Technologies	-	-			24
2.11	Factors Militating Against the Use of Poultry Farming Technologies					26

### **CHAPTER THREE**

3.0	RESEARCH METHODOLOGY -	-	-	-	-	29
3.1	Study Area	-	-	-	-	29
3.2	Sampling Techniques	-	-	-	-	29
3.3	Data Collection	-	-	-	-	30
3.4	Measurement of Variables	-	-	-	-	30
3.5	Methods of Data analysis	-	-	-	-	34
3.6	Test for Hypotheses	-	-	-	-	34

### **CHAPTER FOUR**

4.0	RESULTS AND DISCUSSIONS-	-	-	-	-	36
4.1	Socio-economic characteristics of respondents	-	-	-		36
4.2	Poultry Farming Technologies Available	-	-	-	-	41
4.3	Awareness of Poultry Farming Technologies-	-	-	-		43
4.4	Sources of Information on Poultry Farming Technologies	-	-			44

4.5	Level of Adoption of Poultry Farming Technologies-	-	-	-	-	-	-	46
4.6	Perceived Benefits of Using Poultry Farming Technologies	-	-	-	-	-	-	48
4.7	Factors Militating Against the Use of Poultry Farming Technologies							51
4.8	Test of Hypothesis one	-	-	-	-	-	-	53
4.9	Test of Hypothesis two	-	-	-	-	-	-	57
4.10	Test of Hypothesis three	-	-	-	-	-	-	60
4.11	Test of Hypothesis four	-	-	-	-	-	-	64
<b>CHAPTER FIVE</b>								
5.0	SUMMARY, CONCLUSION AND RECOMMENDATION	-	-	-	-	-	-	68
5.1	Summary	-	-	-	-	-	-	68
5.2	Conclusion	-	-	-	-	-	-	69
5.3	Recommendation	-	-	-	-	-	-	69
	References	-	-	-	-	-	-	71
	Appendix: Questionnaire	-	-	-	-	-	-	78

## LIST OF TABLES

Table 4.1	Socio-economic characteristics of respondents
Table 4.2	Poultry farming technologies available
Table 4.3	Awareness of poultry farming technologies
Table 4.4	Sources of information on poultry farming technologies
Table 4.5	level of adoption of poultry farming technologies
Table 4.6	Perceived benefits of using poultry farming technologies
Table 4.7	Factors militating against the use of poultry farming technologies
Table 4.8	Chi Square Table
Table 4.9	Chi Square Table
Table 4.10	Chi Square Table
Table 4.11	Chi Square Table

## ABSTRACT

This study assessed the adoption of improved poultry farming technologies among farmers in Ovia North-East Local Government Area, Edo State, Nigeria. The research described the socio-economic characteristics of poultry farmers, identified the available poultry farming technologies, assessed the awareness and sources of information about these technologies, determined the level of adoption, evaluated the perceived benefits of using these technologies, and identified factors militating against their adoption.

A two-stage sampling technique was used to select 120 respondents from six communities within the local government area. Data collection was facilitated through structured questionnaires. The data were analyzed using descriptive statistics and Probit regression to draw inferences. A total of 120 questionnaires were distributed but 119 questionnaires were returned as valid response while only one (1) was invalid response. As a result, the 119 questionnaires were analyzed and presented for discussion.

The Results revealed that most poultry farmers were male (52.9%) and married (53.8%), with a significant proportion having secondary education. The majority (57.1%) had over five years of farming experience, with farm sizes ranging from small-scale to large-scale operations. Awareness of improved poultry technologies such as Automatic feeders (86.5%), Water systems (94.1%), Incubators (73.1%), Egg collection and grading machine (51.3%), Poultry vaccination systems (89.1%), and Biosecurity system (57.1%) was high among respondents. However, the level of adoption varied due to several challenges. The high perceived benefits of adopting these technologies included increased productivity, better disease management, Time savings (mean score = 2.66) and Improved animal welfare (mean score = 2.84). Despite these benefits, several factors highly militated against the adoption of improved poultry farming technologies. These included high initial costs of advanced systems (mean = 3.06), limited access to credit facilities (mean = 2.99).

The study concluded that improved poultry farming technologies have significant potential to enhance productivity and sustainability in the sector. However, addressing barriers such as financial constraints, infrastructural deficiencies, and lack of technical expertise is critical for increasing adoption rates. It recommended that government should provide affordable credit facilities to farmers, organize regular training programs to build technical capacity, improve rural infrastructure to support farm operations, and foster partnerships between farmers and technology providers to reduce costs and improve accessibility. By implementing these measures, the adoption of improved poultry farming technologies can be enhanced, contributing to food security and economic growth in Edo State and beyond.

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 BACKGROUND OF STUDY:

The agricultural sector is at the heart of the economy of developing countries. It generates a large share of the gross domestic product (GDP) and employs a significant proportion of the active population. It is an important source of foreign exchange, produces the most basic foodstuffs and is the only source of livelihood and income for more than half of the population of developing countries (OECD/FAO, 2023; Soviadan *et al.*, 2023).

In addition, the development and transfer of technologies and farming techniques increased the efficiency of poultry production. This has led modern poultry farms to grow rapidly in size, concentrate near sources of inputs or output markets and opt for vertical integration (Ao *et al.*, 2021; Chen *et al.*, 2024; Mahanty *et al.*, 2023). The poultry subsector is a significant contributor to the global food supply, with over 19 billion chickens raised annually (FAO, 2020).

Previous studies reported that poultry rearing is one of the most environmentally friendly forms of livestock farming, producing the tiniest amount of greenhouse gas compared to other types of livestock production, such as cattle and other ruminants, which not only emit large amounts of greenhouse gases, but their production is extremely reliant on vegetation cover (Menghistu *et al.* 2021; NDC 2021; Zubir *et al.* 2021).

Poultry is viewed as one of the cheapest source of animal protein and the easiest avenue through which this animal protein can be increased, and ensure protein availability in human diet which serves as primary source of amino acid for body building, provide vitamins and minerals which indirectly supplement deficiency of protein in human system (Bello, 2022).

Historically, poultry farming relied heavily on manual labor and traditional methods, which often resulted in inefficiencies, higher costs, and increased susceptibility to diseases. However, the advent of modern technology has paved the way for transformative changes in the industry. Technologies such as automated feeding systems, environmental control systems, and health monitoring tools have become integral to modern poultry operations.

Cities are transforming beyond physical spaces and becoming smarter and more dynamic ecosystems where emerging technologies influence and enhance every aspect (Chiemeké, 2024).

Due to increased competition, there is pressure to create a surplus at minimum margin and reduce production losses (Hafez and Attia, 2020). To reduce production losses, farmers are supposed to adopt new and improved technologies of poultry farming to reduce production losses due to high mortality, reduced growth rate, delayed disease diagnosis, and non-availability of improved chicks and balanced feed (Patel, 2022).

Examples of improved poultry technology include; Automated feeding systems, Environmental control systems, Health monitoring tools. Despite the clear benefits, the adoption of these technologies is not without challenges. High initial costs, lack of technical expertise, and resistance to change are some of the barriers that farmers face. Additionally, there is a need for continuous training and support to ensure the effective use of these technologies.

This study aims to explore the various improved technologies available to poultry farmers, their impact on productivity and sustainability, and the challenges associated with their adoption.

## 1.2 STATEMENT OF PROBLEM

There are still several obstacles that slow down the implementation of sustainable practices that are useful for the ecological transition (Manta *et al.* 2022). Among them, development and technology transfer capacity and an attitude of resistance of farmers themselves to innovations appear to be the most relevant obstacles (Niggli *et al.* 2017). It follows that, despite the recognition of the sustainable practice benefits, the adoption rate of sustainable innovations remains below the level designated by the Sustainable Development Goals (SDGs) identified by the United Nations for 2030, as many farmers are reluctant to adopt innovations (D'Amato *et al.* 2021; Foguesatto *et al.* 2020; Zeweld *et al.* 2017, 2018). It turned out that psychological factors play a strategic role in influencing the process of innovation adoption and diffusion among farmers (Caffaro and Cavallo 2019; Zulfiqar and Thapa 2018; Price and Leviston 2014), as well as socio-economic factors, including farmer's age, income, and education (Akimowicz *et al.* 2021; Serebrennikov *et al.* 2020; Caffaro and Cavallo 2019), and some contextual factors, such as the size of the farm, and the environmental and political context in which it operates (Piñeiro *et al.* 2020; Foguesatto *et al.* 2020; Hernandez-Vivanco *et al.* 2018; Bravo-Monroy *et al.* 2016). One major barrier to adopting new technology is the high initial cost. Advanced systems like robotics and AI-driven technologies require substantial upfront investment, which can be prohibitive for small and medium-sized producers. Additionally, implementing and maintaining sophisticated technologies necessitates specialized knowledge that many poultry farmers may lack. Regulatory hurdles also complicate the adoption process, as compliance with stringent animal welfare and food safety regulations is required. Furthermore, traditional

farming practices and skepticism about the return on investment can result in hesitancy to embrace new technologies (Sophi Fairman, 2024).

In view of the above, this study tends to provide answers to the following research questions:

1. What are the socio-economic characteristics of poultry farmers in the study area?
2. What are the various types of poultry farming technologies available?
3. What is the awareness of poultry farming technologies available?
4. What are the sources of information on poultry farming technologies?
5. What is the level of adoption of poultry farming technologies available?
6. What are the perceived benefits of using poultry farming technologies?
7. What are the factors militating against the use of poultry farming technologies by poultry farmers?

### **1.3 OBJECTIVES OF THE STUDY**

The broad objective of this study is to assess the adoption of improved technology among poultry farmers in Ovia-North East LGA in Edo State, Nigeria

The specific objectives are to:

1. describe the socio-economic characteristics of poultry farmers in the study area;
2. identify the various types of poultry farming technologies available in the study area;
3. ascertain the awareness of poultry farming technologies available in the study area;
4. determine the sources of information on poultry farming technologies in the study area;

5. ascertain the level of adoption poultry farming technologies available in the study area;
6. ascertain the perceived benefits of using poultry farming technologies in the study area;
7. identify factors militating against the use of poultry farming technologies by poultry farmers in the study area.

#### **1.4 JUSTIFICATION OF THE STUDY**

The poultry industry is a vital sector in many economies, providing employment, income, and food security for millions of people worldwide (FAO, 2020). The adoption of sustainable agricultural innovations offers a promising alternative for mitigating the environmental impacts stemming from agricultural practices (Foguesatto *et al.* 2020). In recent years, there has been a growing recognition of the urgency to adopt more sustainable strategies in the agricultural sector, driven by a desire to assess their positive environmental effects (D'Amato *et al.* 2021). Recognizing the need for technological advancement, several initiatives are underway. Partnerships between poultry producers and technology firms are fostering innovation and the development of tailored solutions for the industry. Government support, through subsidies and grants, is helping to offset the costs associated with adopting new technologies. Training programs and workshops are being established to equip farmers with the necessary skills to implement and maintain modern technologies (Sophi Fairman, 2024).

Improved technology adoption can enhance poultry productivity and efficiency, leading to increased food security and economic growth.

Understanding the factors influencing technology adoption can inform policy and intervention strategies to support poultry farmers.

The study's findings can contribute to the development of effective extension services and training programs for poultry farmers.

The study's results can inform private sector investment decisions and support the development of sustainable poultry farming practices.

## **1.5 HYPOTHESES OF THE STUDY**

The hypotheses of the study are stated in the null form (**H<sub>0</sub>**) and the following hypotheses will be tested:

**H<sub>01</sub>:** There is no significant relationship between the socio-economic characteristics of poultry farmers and level adoption of poultry farming technologies in the Study Area

**H<sub>02</sub>:** There is no significant relationship between the socio-economic characteristics of poultry farmers and sources of information on poultry farming technologies

**H<sub>03</sub>:** There is no significant relationship between the socio-economic characteristics of poultry farmers and perceived benefits of using poultry farming technologies

**H<sub>04</sub>:** There is no significant relationship between the socio-economic characteristics of poultry farmers and factors militating against the use of poultry farming technologies by poultry farmers.

## CHAPTER 2

### 2.0. Literature review

#### 2.1 Overview of poultry farming in Nigeria

The poultry subsector is a significant contributor to the global food supply, with over 19 billion chickens raised annually (FAO, 2020). Poultry is viewed as one of the cheapest source of animal protein and the easiest avenue through which this animal protein can be increased, and ensure protein availability in human diet which serves as primary source of amino acid for body building, provide vitamins and minerals which indirectly supplement deficiency of protein in human system (Bello, 2022).

Nigeria has the largest annual egg production and the second-largest chicken population in Africa, with approximately 180 million birds. The industry produces around 300,000 metric tons of poultry meat and 650,000 metric tons of eggs annually. Despite this large production capacity, local output meets only about 30% of the domestic demand for poultry products, indicating substantial room for growth (Samuel, 2024). Nigeria has the largest annual egg production and the second-largest chicken population in Africa, with approximately 180 million birds. The sector produces 300,000 metric tons of poultry meat and 650,000 metric tons of eggs annually (AgroNigeria, 2023). The Nigerian poultry industry is characterized by smallholder farms, which often face challenges such as limited access to resources, inadequate knowledge of best practices, and financial constraints (Zhou & Zhong, 2021) and (Osugwu et al., 2020). Poultry farming supports the livelihoods of about 85 million Nigerians, many of whom are small to medium-scale farmers. It plays a critical role in poverty alleviation, income generation, and improving nutritional standards by providing

affordable protein sources like eggs and meat. Poultry farming in Nigeria operates under three main systems:

### **Extensive (Free range) System**

The extensive system of poultry farming, commonly referred to as the free-range system, is a traditional and natural method of raising poultry where birds are allowed to roam freely outdoors in search of food, water, and shelter. This system prioritizes the birds' ability to exhibit natural behaviors such as foraging, scratching, and pecking, which are often restricted in more intensive systems. It is particularly suitable for small-scale or subsistence farming and is widely practiced in rural areas of developing countries like Nigeria. Under this system, birds are not confined to enclosures but instead have access to open spaces such as grasslands or pastures. They forage for their food, which may include insects, seeds, and plants, although supplementary feeding is sometimes provided to ensure adequate nutrition. Housing is minimal and often consists of simple shelters to protect the birds from predators and harsh weather conditions. The capital investment required for this system is low due to the minimal infrastructure and equipment needed (Grinphield, 2021). This system accounts for nearly half of the chicken population (80 million birds). It is subsistence-oriented, with flock sizes typically under 50 birds. Indigenous breeds dominate due to their adaptability to local conditions, but productivity levels are low (AgroNigeria, 2023).

### **Semi-Intensive System**

Comprising about one-third of the chicken population (60 million birds), this system combines traditional and modern practices. Flock sizes range from 50 to 2,000 birds, with both indigenous and improved breeds. Productivity is moderate, serving both subsistence and market needs (AgroNigeria, 2023). The semi-intensive system of poultry farming is a

hybrid approach that combines elements of both extensive and intensive systems. It provides birds with access to outdoor areas for foraging and exercise during the day while offering indoor shelter for resting, nesting, and protection from predators and harsh weather conditions. This system is widely adopted by small- to medium-scale poultry farmers due to its balance between cost efficiency, bird welfare, and productivity. In this system, birds are housed in structures that may include barns, aviaries, or fold units. These structures are designed to allow natural ventilation and light while protecting the birds from environmental stressors. Outdoor runs or pastures are fenced to prevent predation and manage the birds' movement. Feed and water are provided indoors, but the birds can supplement their diet by foraging for insects, seeds, and vegetation in the outdoor areas. This natural supplementation improves the nutritional quality of poultry products such as meat and eggs. The system offers several advantages over intensive farming. Birds raised under semi-intensive conditions experience better welfare due to increased freedom of movement and opportunities to exhibit natural behaviors. This reduces stress and improves overall health, leading to higher-quality meat and eggs with enhanced nutritional profiles, including increased omega-3 fatty acids and vitamin D content. Additionally, the reduced stocking density lowers the risk of disease transmission compared to intensive systems. The system is also more environmentally sustainable as it minimizes energy consumption by reducing reliance on artificial lighting and ventilation.

However, the semi-intensive system requires careful management to maximize its benefits. Farmers must ensure proper predator control, manage outdoor areas to prevent overgrazing or contamination, and provide adequate space per bird to maintain welfare standards. While infrastructure costs are moderate compared to intensive systems, the need for land and

regular monitoring can increase operational demands. Productivity levels in this system are typically intermediate between extensive and intensive systems.

### **Intensive System**

The intensive system of poultry farming is a highly productive method that maximizes efficiency by housing birds in controlled environments, often using high-density battery cage systems or deep litter systems (Edimar.Caetano, 2023). This approach allows for a large number of birds to be raised in a relatively small space, optimizing land use and resource allocation. The intensive system is characterized by strict control over environmental variables such as temperature, humidity, and lighting, which enhances bird growth rates and feed conversion efficiency. Advanced technology and automation play a crucial role in intensive farming, with automated feeding, watering, and ventilation systems contributing to improved productivity and reduced mortality rates. One of the primary advantages of the intensive system is its ability to meet the high demand for poultry products by increasing production efficiency and reducing costs per unit as stated by Edimar.Caetano (2023). This is achieved through economies of scale, where large-scale production leads to lower operational costs and higher profitability. Additionally, intensive systems offer better protection against predators and theft, reducing losses compared to extensive systems (Veterinaria Digital S.A., 2024). However, the intensive system also poses challenges, particularly regarding animal welfare and environmental impact. High stocking densities can lead to stress among birds and increase the risk of disease transmission, necessitating rigorous biosecurity measures (Gržinić et al., 2022). Furthermore, intensive farming can have significant environmental implications, such as increased waste production and resource consumption (Gržinić et al., 2022).

Representing 21% of poultry production (40 million birds), this system involves large-scale commercial farms with over 2,000 birds per operation. Exotic breeds are used for high productivity in meat and egg production. Most intensive farms are concentrated in the southwestern region near urban centers (Oyeniya *et al.*, 2024).

## **2.2 Socio-Economic Characteristics of Poultry Farmers in Nigeria**

Understanding the socio-economic profile of poultry farmers is crucial for assessing technology adoption. Key characteristics include age, gender, education, income, and farming experience (Ovharhe *et al.*, 2021). Studies in similar regions of Nigeria have shown that these factors significantly influence the adoption of agricultural technologies.

### **Age and Gender**

Data suggests that most poultry farmers are males with a mean age of 30 years (Ovharhe *et al.*, 2021). However, other studies indicate a significant involvement of women in poultry farming, particularly in backyard operations (Okoedo-Okojie *et al.*, 2012). The age of farmers can influence their openness to new technologies, with younger farmers often being more receptive (Ovharhe *et al.*, 2021).

### **Education Level**

Education enhances the capacity to understand and implement new technologies. Farmers with higher education levels are better equipped to access and interpret information related to improved practices (Okoedo-Okojie *et al.*, 2012).

### **Farming Experience**

Farming experience plays a crucial role in technology adoption, as farmers with more years of experience may have developed traditional methods and be more resistant to change (Ovharhe *et al.*, 2021).

## **Economic Factors**

Farmers' access to credit, farm size, and income levels are critical in determining their ability to invest in improved technologies. The profitability of layer enterprises is closely linked to the socio-economic characteristics of the farmers. (Writing, 2023)

Food security status of farmers is important for policy formulation (Ahmadu & Okoror, 2019).

## **2.3 Awareness of Poultry Farming Technologies**

Awareness is the initial step toward technology adoption. Farmers need to be informed about the available technologies and their potential benefits (Okoedo-Okojie *et al.*, 2012).

### **Technology Awareness**

Farmers in the southern agricultural zone of Edo State need more knowledge about different poultry technologies.

### **Training Programmes**

Training programs play a vital role in increasing awareness and knowledge of improved technologies, including feed formulation, disease management, and housing preparation

## **2.4 Definition of Technology:**

In poultry farming, technology encompasses a broad range of tools, techniques, and practices aimed at enhancing productivity, efficiency, and sustainability (The Farming Insider, 2024). It includes automated feeding and watering systems, climate control devices, and sensors (The Farming Insider, 2024; agriNews, 2024). Software solutions like data analytics platforms and AI-driven algorithms also fall under the technological umbrella, as these

systems monitor bird health and predict performance (agriNews, 2024). Technology also incorporates improved management practices, biosecurity measures, optimized feeding schedules, and effective disease prevention strategies. Furthermore, genetic advancements achieved through selective breeding techniques for developing high-yield and disease-resistant breeds are included. Thus, technology involves a holistic approach that integrates physical tools with knowledge-based practices to improve overall farm operations (The Farming Insider, 2024).

## **2.5 Diffusion of Innovation Theory (DOI)**

The Diffusion of Innovation Theory, developed by Everett Rogers (2003), is a prominent social science framework that explains how new ideas and technologies spread through a population over time. It provides valuable insights into the process of technology adoption, including in the context of poultry farming. This theory emphasizes that adoption is not a singular event but rather a process that unfolds in stages, influenced by various factors related to the innovation itself, the potential adopters, and the social system in which they operate. Rogers' Diffusion of Innovation theory serves as a foundational framework for understanding how new technologies spread within a social system. It posits that the adoption process is influenced by the perceived attributes of the innovation, including its relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). In the context of poultry farming, farmers are more likely to adopt improved technologies if they perceive them as beneficial compared to traditional practices. In Nigeria's poultry sector, the diffusion of improved technologies can be influenced by several factors:

### **Socioeconomic Factors**

Access to education and resources affects farmers' willingness to adopt new technologies.

Educated farmers are more likely to understand and implement innovations effectively.

### **Communication channels**

The role of extension services and peer influence is critical. Early adopters can demonstrate the benefits of new practices to their neighbors, facilitating broader acceptance (AgriFutures Australia, 2023).

### **Perceived Benefits**

Farmers are more likely to adopt technologies that they believe will enhance productivity and profitability. If improved poultry breeds lead to higher egg production or better disease resistance, this perceived utility drives adoption (Sodjinou & Henningsen, 2012).

### **Risk and Uncertainty**

Many farmers may hesitate to adopt new technologies due to fears about their effectiveness or potential costs. Providing information and demonstrating successful case studies can help mitigate these concerns (Birhanu et al., 2022).

### **Cultural Context**

Traditional practices and local beliefs can either hinder or facilitate adoption depending on how well new technologies align with existing farming practices and community values (Looney et al., 2022).

## **2.6 Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM) is a theoretical framework that explains how users come to accept and use new technologies. Developed by Davis (1989),

TAM posits that perceived usefulness (PU) and perceived ease of use (PEOU) are the primary determinants of technology acceptance. In poultry farming, if farmers believe that improved technologies will enhance their productivity and are easy to implement, they are more likely to adopt them. This model has been widely applied in agricultural technology studies to assess user acceptance and intention to use new technologies.

### **Perceived Usefulness (PU)**

PU refers to the degree to which a farmer believes that using a particular technology will enhance their agricultural productivity. In poultry farming, this could relate to improved feed management systems, better housing designs, or advanced health management practices. If farmers perceive that these technologies will lead to higher yields, reduced mortality rates, or increased profitability, they are more likely to adopt them (Davis, 1989).

### **Perceived Ease of Use (PEOU)**

PEOU denotes how easy a technology is to use. Technologies that require minimal training or adjustment are more likely to be adopted by farmers who may have limited technical skills or resources. For instance, if a new feeding system is straightforward to implement and does not require complex machinery or extensive training, farmers are more inclined to adopt it (Davis, 1989).

For example, a technology with a simple interface and clear instructions would likely be perceived as easier to use than one that is complex and requires specialized training.

### **Behavioral Intention**

Behavioral intention is influenced by PU and PEOU and reflects the likelihood that a farmer will adopt a specific technology. A positive intention towards adopting improved poultry technologies can lead to actual usage (Ajzen, 1991).

## **Actual System Use**

The ultimate goal of TAM is to predict actual usage based on behavioral intention. When farmers perceive a technology as useful and easy to use, they are more likely to integrate it into their farming practices.

## **2.7 Improved Poultry Technologies in Nigeria**

### **2.7.1 Genetic Improvements**

Genetic improvements in poultry farming involve the development and adoption of high-yielding breeds that offer better productivity and resilience compared to indigenous breeds. These improvements are crucial for enhancing the efficiency and profitability of poultry operations in Nigeria. Aspects of Genetic Improvement includes:

#### **Dual Purpose Breeds**

Breeds like Kuroiler and Sasso are popular for their dual-purpose capabilities—producing both eggs and meat efficiently. These breeds are known for their heat tolerance, disease resistance, and ability to thrive in small-scale farming conditions. For instance, the African Poultry Multiplication Initiative (APMI) has successfully distributed dual-purpose breeds to smallholder farmers in Nigeria, improving their productivity and livelihoods.

#### **Improved Traits**

Modern breeds are bred for specific traits such as faster growth rates, higher egg production, and better feed efficiency. These traits help farmers reduce costs and increase profitability. Studies have shown that improved dual-purpose breeds can reach a weight of 1.5 kg to 2.0 kg in three months and produce about 120 to 180 eggs annually, outperforming indigenous breeds.

## **Adaptability**

Many improved breeds are designed to be adaptable to tropical conditions, making them suitable for Nigeria's climate. This adaptability is crucial for reducing mortality rates and improving overall farm performance.

### **2.7.2 Feed Technology Innovations**

Feed technology innovations play a crucial role in enhancing the efficiency and sustainability of poultry farming in Nigeria. These innovations aim to improve feed quality, reduce production costs, and increase the availability of nutritious feed for poultry. Here are some key aspects of feed technology innovations relevant to Nigerian poultry farming:

#### **Use of Alternate Feed Resources**

Innovations focus on utilizing alternative feed resources such as cassava peels, sorghum, and other locally available ingredients to reduce dependence on imported maize and soybeans. This approach not only lowers costs but also supports sustainable agriculture practices. For instance, research has shown that processing wet cassava peels into high-quality animal feed ingredients can be a cost-effective and sustainable solution for small-scale farmers (Okike et al., 2015).

#### **Improved Feed Formulation and Fortification**

Modern feed formulation involves enriching feeds with essential micronutrients and vitamins to enhance bird health and productivity. However, in regions like Akwa Ibom State, the adoption of advanced feed fortification technologies remains limited, with many farmers relying on traditional methods.

#### **Digital Technologies in Feed Production**

Innovations like the FeedCalculator app have shown potential in generating affordable, quality feed recipes using locally available ingredients. Although primarily tested in Tanzania, such technologies could be adapted for Nigerian conditions, helping farmers optimize feed costs and quality.

### **Investment in Local Feed Production Facility**

Companies like Nutreco have invested in state-of-the-art feed production facilities in Nigeria, using locally sourced raw materials to produce high-quality feeds. This not only boosts local feed availability but also supports economic growth by creating jobs and stimulating agricultural development.

### **2.7.3 Health Management Systems**

Health management systems are crucial for maintaining the health and productivity of poultry flocks in Nigeria. Effective health management involves a combination of strategies to prevent disease outbreaks, manage existing health issues, and improve overall flock well-being. Here are some key aspects of health management systems relevant to Nigerian poultry farming:

#### **Vaccination Programs**

Regular vaccination is essential for protecting poultry from diseases such as Newcastle disease and avian influenza. Vaccination programs help reduce mortality rates and prevent economic losses due to disease outbreaks. For instance, a study in Southwest Nigeria found that 96.8% of farmers vaccinated their chickens, highlighting the importance of vaccination in health management practice (Adeshinwa, 2021).

#### **Biosecurity Measures**

Implementing strict biosecurity protocols is vital for preventing the introduction and spread of diseases on farms. This includes practices like proper sanitation, restricted access to farms, and use of personal protective equipment (PPE). A study in Ilorin, Kwara State, emphasized the need for improved biosecurity to prevent disease outbreaks (Elelu *et al.*, 2012).

### **Disease Surveillance**

Continuous monitoring of flock health through regular inspections and diagnostic tests helps in early detection of diseases. This proactive approach allows for timely intervention and treatment. The key principles of poultry health management include prevention, early recognition, and early treatment of diseases (Plaza, 2020).

### **Nutritional Health**

Providing balanced nutrition is critical for maintaining immune function and overall health. Nutritional deficiencies can make birds more susceptible to diseases.

The specific technologies relevant to this study will be identified and examined within the context of local farming practices in Ovia-North East LGA, but a general overview is provided below:

### **Improved Breeds**

Recently, the Nigerian government has released new chicken breeds, including the **Noiler** and **Cobb 500**, to boost agricultural productivity. The **Noiler** is a dual-purpose breed suitable for both meat and eggs, while the **Cobb 500** is known for its high meat yield (Ali, 2024; Blessing, 2024). These improved breeds are crucial for enhancing the efficiency and sustainability of poultry farming in Nigeria by offering better resistance to diseases, improved feed efficiency, and higher productivity compared to traditional breeds.

### **Housing Systems**

Housing systems in poultry farming are designed to provide a safe and healthy environment for birds, enhancing their productivity and well-being. In Nigeria, several types of housing systems are used, each with its advantages and disadvantages. There are several types of housing systems which are:

❖ **Free range or Extensive System**

This traditional method allows birds to roam freely, often without restrictions on movement. It is inexpensive and requires minimal supervision, making it suitable for small-scale farming. However, it poses risks such as exposure to predators and diseases, and birds may lay eggs in hidden areas, leading to egg loss (Agricincome, 2024).

❖ **Semi-Intensive System**

This system combines elements of free-range and intensive systems. Birds are partly raised on free-range and partly in sheltered areas. It offers a balance between freedom and supervision, providing shelter at night and feed during the day. This system is less common among small-scale farmers due to its moderate costs (Admin, 2024).

❖ **Intensive System**

The most common among commercial poultry farmers, this system confines birds to a specific area where their movement is restricted. It includes subtypes like deep litter and battery cage systems. Deep litter systems use bedding materials to absorb waste, while battery cages optimize space and egg collection efficiency but can raise welfare concerns (Agricincome, 2024).

❖ **Folding Unit System**

This system involves enclosures that can be moved from one location to another. It is efficient for managing large numbers of birds and is considered modern and convenient for commercial poultry production (Agricincome, 2024).

### **Feeding Systems**

Efficient feeding is essential for optimizing growth and production in poultry. Improved feeding systems can ensure that birds receive the correct amount of nutrients at the right time. These systems can include automated feeders, which deliver precise feed rations, and specialized feeding troughs designed to minimize feed wastage. Proper nutrition is crucial for maximizing the genetic potential of improved breeds and ensuring optimal performance.

### **Disease Control Measures**

Disease outbreaks can devastate poultry flocks, causing significant economic losses. Effective disease control measures are critical for preventing and managing diseases. These measures can include vaccination programs, biosecurity protocols (e.g., restricting access to the farm, disinfecting equipment), and the use of medications when necessary. Early detection and prompt treatment of diseases are essential for minimizing their impact. Access to veterinary services and information on disease management is crucial for effective disease control.

### **Processing Equipment**

For farmers who process their poultry products, improved processing equipment can enhance efficiency and product quality. This can include equipment for slaughtering, defeathering, evisceration, and packaging. Improved processing methods can also help to extend the shelf life of poultry products and add value to them.

## **Waste Management Technologies**

Proper management of poultry waste is essential for environmental sustainability and disease control. Technologies such as composting, anaerobic digestion, and manure processing can help to convert poultry waste into valuable products (e.g., fertilizer, biogas) or reduce its environmental impact. Sustainable waste management practices are increasingly important as environmental concerns grow.

## **Data Management and Record Keeping**

Accurate record-keeping is essential for effective farm management. Modern technologies, such as computer software and mobile apps, can help farmers to track key performance indicators (KPIs), such as feed consumption, egg production, growth rates, and mortality rates. This data can be used to make informed decisions about farm management practices and optimize production.

## **2.8 Awareness and Information Sources**

Awareness and information sources play a crucial role in the adoption of improved poultry technologies among farmers in Nigeria. Studies have shown that awareness of these technologies is high among poultry farmers, particularly for practices like vaccination and improved feeding systems. For instance, a study in Kaduna State found that all farmers were aware of vaccination and improved feeding technologies, with a significant percentage having adopted these practices (Ishola *et al.*, 2023).

### **2.8.1 Sources of Information:**

**Extension Services:** Agricultural extension services are a primary source of information for farmers. These services provide training and guidance on best practices, including improved

poultry technologies. For instance, a study in Gokana Local Government Area, Rivers State, highlighted the importance of extension services in promoting the adoption of improved technology packages among poultry farmers.

**Information and Communication Technologies (ICTs):** ICTs, particularly mobile phones, are increasingly important for accessing and disseminating information among poultry farmers. Studies have shown that ICTs can enhance technical efficiency and productivity in poultry egg production by providing timely access to market information and best practices (Akomolafe et al., 2021).

**Training Programs and Workshops:** Training programs organized by government agencies, NGOs, and private organizations are essential for educating farmers about new technologies. These programs help bridge knowledge gaps and improve the adoption of improved practices. For example, a study in Jalingo Local Government Area of Taraba State emphasized the need for effective communication of innovations to farmers to enhance adoption.

**Peer Influence and Networking:** Word of mouth and networking among farmers are significant channels for sharing experiences and information about effective technologies. This informal exchange helps in spreading awareness and encouraging the adoption of new practices (Oladeji, 2011).

**Publications and Digital Platforms:** Digital platforms and publications provide comprehensive information on proven poultry technologies. These resources are crucial for farmers seeking to improve productivity and efficiency

## **2.9 Factors Influencing the Adoption of Improved Poultry Technologies**

Several factors influence the level of technology adoption among poultry farmers:

**Socio-economic factors:** As discussed earlier, factors such as age, education, experience, farm size, access to credit, and income level can significantly influence technology adoption (Doss, 2006). For example, farmers with larger farms and better access to credit may be more likely to adopt capital-intensive technologies.

**Technology attributes:** The characteristics of the technology itself, such as its relative advantage, compatibility, complexity, trialability, and observability, play a crucial role in adoption decisions (Rogers, 2003). Technologies that offer clear benefits, are easy to use, and can be easily tested are more likely to be adopted.

**Information access:** Farmers' access to information about available technologies and their understanding of the benefits and proper implementation of these technologies are essential for adoption. Effective extension services and other information sources can significantly influence adoption levels (Leeuwis & Aarts, 2010).

**Risk perception:** Farmers' perceptions of the risks associated with adopting a new technology can affect their adoption decisions. If farmers perceive a technology as risky or uncertain, they may be less likely to adopt it.

**Market conditions:** Market factors, such as the prices of poultry products and inputs, can influence the profitability of adopting a new technology. If market conditions are favorable, farmers may be more likely to invest in new technologies.

**Institutional factors:** Institutional factors, such as government policies, regulations, and support programs, can also influence technology adoption. Supportive policies and programs can encourage adoption, while unfavorable policies can hinder it.

## 2.10 Perceived Benefits of Poultry Farming Technologies

Farmers' perceptions of the benefits derived from using improved poultry farming technologies are powerful drivers of adoption decisions. Even if a technology is technically superior, its adoption hinges on whether farmers “perceive” it as advantageous and aligned with their goals. These perceived benefits can be diverse and may include:

**Increased Productivity and Output:** A primary perceived benefit is often the expectation of increased productivity. This can translate to higher egg production from layers, faster growth rates in broilers, or improved feed conversion ratios.

**Enhanced Profitability:** Ultimately, farmers are concerned with profitability. Technologies that are perceived to increase income or reduce costs are more likely to be adopted. Improved breeds, for example, can lead to higher yields and thus increased revenue, while technologies like automated feeding systems might reduce labor costs.

**Reduced Labor and Time:** Some technologies are perceived to reduce the amount of labor and time required for poultry farming operations. Automated feeding and watering systems, for instance, can free up farmers' time for other activities. This is particularly important in regions where labor is scarce or expensive.

**Improved Flock Health and Reduced Mortality:** Technologies that contribute to better flock health and reduce mortality rates are highly valued by farmers. Improved housing systems, vaccination programs, and biosecurity measures can minimize disease outbreaks and losses.

**Improved Product Quality:** Certain technologies can enhance the quality of poultry products. For example, proper feeding and housing can lead to better egg quality (size, shell strength, etc.) and meat quality (tenderness, flavor). This can translate to higher market prices and increased competitiveness.

**Reduced Risk and Uncertainty:** Some technologies can help to reduce the risks associated with poultry farming, such as risks related to disease outbreaks, weather conditions, and market fluctuations. For instance, climate-controlled housing can mitigate the impact of extreme weather events on poultry production.

**Enhanced Environmental Sustainability:** Increasingly, farmers are becoming aware of the importance of environmental sustainability. Technologies that reduce the environmental impact of poultry farming, such as manure management systems, may be perceived as beneficial, especially in regions with strict environmental regulations.

**Social Prestige and Recognition:** In some communities, adopting new technologies can enhance a farmer's social standing and recognition. Farmers who are seen as innovative and progressive may gain respect and influence within their communities.

**Access to New Markets:** Adopting certain technologies can open up access to new markets. For example, farmers who adopt improved processing and packaging technologies may be able to sell their products to a wider range of consumers, including supermarkets and restaurants.

## **2.11 Factors Militating Against the Use of Poultry Farming Technologies**

Despite the potential benefits of improved poultry farming technologies, several factors can hinder their adoption by farmers. These constraints can be categorized as:

**I High Cost of Technology:** Many improved technologies, such as modern housing systems, automated feeders, and processing equipment, require significant upfront investment. Small-scale farmers, who often have limited financial resources, may find it difficult to afford these technologies.

**II Lack of Access to Credit:** Access to credit is crucial for overcoming financial constraints. However, many farmers, particularly in developing countries, lack access to affordable credit (Doss, 2006). This can prevent them from investing in new technologies, even if they recognize their potential benefits. Despite the acknowledge importance of poultry production Akanni (2007) opined that it is characterized by low production level due to limited finance for the procurement of basic poultry equipment and materials.

**III High Input Costs:** In addition to the initial cost of the technology, farmers may also face high recurring costs for inputs such as improved breeds, feed, and medications. Fluctuations in input prices can create uncertainty and make it difficult for farmers to plan their investments.

**IV Lack of Technical Knowledge:** Some technologies require specialized knowledge and skills to use effectively. Farmers who lack the necessary technical expertise may be hesitant to adopt new technologies, fearing that they will not be able to implement them properly.

**V Complexity of Technology:** Some technologies can be complex and difficult to understand, especially for farmers with limited education or experience. If a technology is perceived as too complicated, farmers may be less likely to adopt it.

**VI Availability of Spare Parts and Maintenance Services:** For some technologies, it may be difficult to find spare parts or reliable maintenance services. This can create a risk of downtime and disruption to poultry operations if the technology breaks down.

**VII Traditional Farming Practices:** Some farmers may be reluctant to abandon traditional farming practices, even if they are aware of the benefits of new technologies. This can be due to cultural beliefs, social norms, or simply a resistance to change.

**VII Lack of Trust:** Farmers may be hesitant to adopt new technologies if they do not trust the source of the information or the technology itself. Building trust through demonstrations, farmer-to-farmer exchanges, and credible extension services is essential for overcoming this barrier.

**IX Risk Aversion:** Farmers are often risk-averse, especially small-scale farmers who have limited resources to fall back on. They may be reluctant to adopt new technologies if they perceive a high risk of failure or uncertainty about the potential benefits.

**X Inadequate Extension Services:** Effective extension services play a crucial role in disseminating information about new technologies and providing technical support to farmers. However, in many developing countries, extension services are underfunded and lack the capacity to reach all farmers effectively.

**XI Lack of Infrastructure:** Inadequate infrastructure, such as poor roads, unreliable electricity supply, and limited access to markets, can hinder the adoption of some technologies. For example, farmers may be reluctant to invest in refrigeration equipment if they do not have a reliable electricity supply.

**XII Weak Market Linkages:** Farmers may be less likely to adopt technologies that increase production if they do not have access to reliable markets for their products. Strengthening market linkages and ensuring that farmers have access to profitable markets is essential for promoting technology adoption.

## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Area and scope of study**

The study was conducted in Edo state, Nigeria. The state is located in the South-South geopolitical zone of the country. The state has 18 local government areas with the capital in Benin City. The state has a population of 4.78 million people (EDADP, 2006). The state has a land mass of 19,794 square kilometer and geographical located between 054E to 045E longitudes. It has boundaries with Kogi State to the North, Delta State to the East and South, Ekiti and Ondo States to West. The climate is typically tropical with two major seasons, wet (rainy) and dry (hot) seasons.

The state is blessed with two major vegetation belt, namely, the rain forest belt in the south and central parts, while the guinea savannah is predominant in the Northern part. The major agricultural activities of the state include the cultivation of crops such as yam, cassava, maize, rice (in Esan part), cocoa, oil palm, rubber, pineapple, cashew, mango, kola, avocado pear and also wood products. This study will be limited to the investigation of the level of adoption of agricultural technology by poultry farmers in Ovia North East LGA, Edo state.

#### **3.2 Sampling techniques and sample size**

A TWO-stage sampling procedure was used in the selection of the poultry farmers. The first stage involved the random selection of six (6) communities (Okada, Ekiadolor, Oluku, Uhen, Utese, Iyowa) in the study area. The second stage involved the simple random sampling of twenty (20) poultry farmers in each of the selected six (6) towns which corresponds to a sampling size of one hundred (120) respondents.

### **3.3 Data collection**

The study utilized two major sources of data. These are primary and secondary sources of data. The primary data was derived through questionnaire and interview, while the secondary data was obtained from journals, books, internet and theses.

### **3.4 Measurement of variables**

#### **Independent Variables:**

The socio-economic characteristics of the respondents was measured as follows:

1. Age: Respondents will indicate their age in years.
2. Sex: Measured by selecting male or female.
3. Marital Status: Measured with options like single, married, divorced, or widowed.
4. Educational Background: Respondents will indicate their highest educational qualification, such as no formal education, primary, secondary, OND/HND, NCE, B.Sc., M.Sc., or Ph.D.
5. Family Size: Measured by asking respondents to state the number of persons living under the same roof.

6. Farming Experience: Respondents will indicate their years of experience in poultry farming.
7. Farm Size: Respondents will fill in their farm size (number of birds or capacity) in units such as square feet or total number of birds.
8. Income per Season: Respondents will state their income per poultry production season, measured in Naira (#).
9. Source of Labour: Respondents will indicate whether their source of labour is family, hired, or mechanized.
10. Poultry Type: Measured by asking respondents to indicate the types of poultry farming (e.g., layers, broilers, or mixed farming).

**Dependent Variables:**

1. Types of Poultry Farming Technologies Available: Measured by listing common technologies like automatic feeders, incubators, water systems, and disease control systems, and respondents will indicate which ones are available to them (Yes/No).
2. Awareness of Poultry Farming Technologies: Measured by asking respondents to indicate if they are aware of specific technologies. Responses will be binary (Yes/No).
3. Sources of Information on Poultry Farming Technologies: Measured by providing a list of potential information sources such as extension agents, fellow farmers, the internet, agricultural shows, or mass media. Respondents will check all that apply.
4. Level of Adoption of Poultry Farming Technologies: Measured by asking respondents to rate the extent of their use of various technologies on a scale (1 = Never used, 2 = Rarely used, 3 = Sometimes used, 4 = Regularly used).

categorize the scores into high or low levels of adoption based on a threshold. Low Adoption: Average score  $\leq 2.5$  ("never used" or "rarely used") High Adoption: Average score  $> 2.5$  ("sometimes used" or "regularly used").

5. Perceived Benefits of Using Poultry Farming Technologies: Measured using a Likert-type scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree) on statements regarding the benefits, such as increased productivity, cost reduction, time savings, or disease prevention.

6. Factors Militating Against the Use of Poultry Farming Technologies: Measured using a four-point Likert scale (1 = Not a problem, 2 = Not serious, 3 = Serious, 4 = Very serious) on factors like cost, lack of awareness, access to credit, and technical knowledge. A mean score of 2.50 will distinguish serious factors from non-serious ones.

**Objective 1: Socio-economic characteristics of poultry farmers:**

**Age** of the poultry farmers will be measured in years;

**Sex** was measured as either male or female.

**Marital status** of the respondents will be measured as Single =1, Married = 2, Divorced = 3, widow/widower = 4.

**Household size** will be measured as number of persons living and eating from one pot in a household.

**Educational qualification** will be measured as: no formal education = 1, primary education = 2, secondary education = 3, tertiary education = 4.

**Farming experience** will be measured in years as below two (2) years = 1, two to five years (2-5) =2, six to nine years (6-9) =3, ten years and above =4.

**Farm size** will be measured using number of birds.

**Annual farm income** using income per poultry production, measured in naira.

**Source of labour** will be measured as family labour = 1, hired labour = 2, and both = 3.

**Poultry type** indicate the types of poultry farming, e.g. broilers, layers, or mixed farming.

**Objective 2: To identify the various types of poultry farming technologies available:**

Measured by listing common technologies like automatic feeders, incubators, water systems, and disease control systems, and respondents will indicate which ones are available to them (Yes/No).

**Objective 3: To ascertain the awareness of poultry farming technologies available:**

Measured by asking respondents to indicate if they are aware of specific technologies. Responses will be binary (Yes/No).

**Objective 4: Sources of information on poultry farming technologies:**

Measured by providing a list of potential information sources such as extension agents, fellow farmers, the internet, agricultural shows, or mass media. Respondents will check all that apply.

**Objective 5: To ascertain the level of adoption of poultry farming technologies available:**

Measured by asking respondents to rate the extent of their use of various technologies on a scale (1 = Never used, 2 = Rarely used, 3 = Sometimes used, 4 = Regularly used).

The scores will be categorized into high or low levels of adoption based on a threshold. Low Adoption: Average score  $\leq 2.5$  ("never used" or "rarely used"). High Adoption: Average score  $> 2.5$  ("sometimes used" or "regularly used").

**Objective 6: Perceived Benefits of Using Poultry Farming Technologies:** Measured using a Likert-type scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree) on statements regarding the benefits, such as increased productivity, cost reduction, time savings, or disease prevention.

**Objective 7: Factors Militating Against the Use of Poultry Farming Technologies:** Measured using a four-point Likert scale (1 = Not a problem, 2 = Not serious, 3 = Serious, 4 = Very serious) on factors like cost, lack of awareness, access to credit, and technical knowledge. A mean score of 2.50 will distinguish serious factors from non-serious ones.

### **3.5 Data Analyses**

Both inferential and descriptive statistics will be employed for data analysis. Objectives 1 – 7 was analyzed using descriptive statistics such as means, frequencies, percentages, standard deviation.

### **3.6 Test for Hypothesis**

The Hypotheses was tested as follows;

#### **Hypotheses 1, 2, 3, and 4 were tested using Chi-square**

Chi-square is a statistical hypothesis test used to determine if there's a significant association between two categorical variables in a dataset. It compares observed frequencies in the data

with expected frequencies that would occur if there were no association between the variables.

$$X^2 = \frac{\sum O_i - E_i^2}{E_i}$$

Where  $X^2$  = Chi-square

$O_i$  = Observed value

$E_i$  = Expected value

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

This chapter presents the data analysis of responses from the respondents on Adoption of improved technology to poultry farmers in Ovia North-East LGA, Edo State, Nigeria. It deals with the presentation of results as well as the provision of the analysis of the primary data generated from questionnaire survey carried out in the study areas on which the discussion of result will be presented. A total of 120 questionnaires were distributed but 119 questionnaires were returned as valid response while only one (1) was invalid response. As a result, the 119 questionnaires were analyzed and presented for discussion. The data for this research was analyzed using the statistical package for social sciences (SPSS) version 24, and presented using means, frequencies, percentages, and tables.

#### **4.1 Socio-Economic Characteristics of Respondents**

##### **4.1.1 Age**

The result presented in Table 4.1 shows that the mean age of respondents was 42.4 years. This means that the respondents were relatively young, and in their active years. This implies that the respondents are full of strength and capable to matching the stress that comes with farming. This agrees with Nwibo et al, (2016) who stated that the continuous encouragement and promotion of Agripreneurship has accounted for the increase in the numbers of those engaging in farming especially the youth. Onuekwusi, Nmeragini, Amanze, (2019) added that poultry production is among the foremost important agripreneurship venture being involved by the youths in Nigeria after crop production. Food and Agricultural

Organization, (2017) noted that though the youth are taking interest in farming, more still needs to be done in getting them fully involved.

#### **4.1.2 Sex**

It was revealed from Table 4.1 that majority (52.9%) of the poultry farmers were male. This suggests that men took more interest in poultry farming than women in the study area. However, the findings of Suleiman, Tafida, Nazifi, and Inuwa (2023) put it that though the male folks takes more interest in farming, the female folks takes it more as a fulltime occupation.

#### **4.1.3 Marital Status**

Table 4.1 shows that 53.8% of the respondents were married. This means that married people were more involved in farming and may receive assistance from family members in carrying out some activities on the poultry farm such as feeding, cleaning and management. This result agrees with Kimaro and Toribio's (2018.) who noted that more married people take interest in farming than every other marital status classification. In addition, Suleiman, Tafida, Nazifi, and Inuwa (2023) established that more married people engage in poultry farming which which makes it necessary for them to participate in economic activities as a means of catering to the needs of their families.

#### **4.1.4 Educational qualification**

Table 4.1 shows that a higher percentage of the respondents have at least an OND degree. This implies that most of the poultry farmers are educated but with different educational levels OND/HND (14.3%), NCE (6.7%), B.Sc (30.3%), M.Sc (9.2%) Ph.D. (4.2%). This agrees with Oyeyinka, Raheem, Ayanda, and Abiona, (2021) who noted that 84.3% of

poultry farmers are educated and might have acquired knowledge and skills involved in poultry production through various forms of education they acquired during schooling.

#### **4.1.5 Family Size**

Majority of the poultry farmers (57.1%) as shown in table 4.1 had Family Size of 1-3 persons with an average size of 4 persons, while 35.3% of the poultry farmers had a family size of 4-6 persons, while only 5.9% had a family size of 7-9 persons, and 1.9% had a family size of 10 persons and above.

#### **4.1.6 Farming experience**

Majority (57.1%) of the respondents have 4 to 6years farming experience with a mean of 5.6years. This implies that the poultry farmers are not relatively new in the poultry farming industry which means they are well grounded in the knowledge of poultry business and management. In line with this Zhou and Lele, (2022) explained that having farming experience can play a significant role in promoting business operations, those who have farming experience tends to do better than those who don't have experience (Zhou and Lele, 2022). Furthermore, Zhou and Lele, (2022) revealed that Farming experience has an impact on behavior, which has implications for decision making.

#### **4.1.7 Farm Size**

Table 4.1 show that the average farm size of the respondent is 1,600 birds, this reveal that the respondents are not small-scale poultry farmers. It is also important to note that the larger the farm capacity, the larger the output and income. Noack and Larsen (2019) put it that farmers benefit from larger farms, earning higher and more stable incomes.

#### **4.1.8 Income Per Season**

Table 4.1 shows that the average Income Per Season for the poultry farmers in the study area is

4.2million, this is possible due to the fact that the farmers are not small-scale farmers. This also suggest that poultry farming is a lucrative business if properly managed. However, the level and scale of farm operation determines the level of income to be earned Noack and Larsen (2019).

#### 4.1.9 Source of Labour

Table 41 show that majority (68.1%) of the poultry farmers get their labour from Family members. This suggest that the farmers do not spend more on labor and payment of salaries which in turn increase their profit margin. This supports the work of Koledoye (2024) who found noted that farmers make use of family labour the more especially in specific areas of the farm operations. Albert et al. (2020) also agreed to this that farmers use family labour more in task execution.

#### 4.1.10 Type of Poultry Farming

It was revealed that broiler farming (63.2%) is the most dominant type of Poultry Farming engaged by poultry farmers in the study area. However, 32.4% of the respondents operate a Mixed Farming of both broilers and layers. This disagree with Oyeyinka, Raheem, Ayanda, and Abiona, (2021) who revealed that majority of his respondents (69.9%) are keeping layers while minority of 28.9% are keeping broilers and cockerels. Nure, Shariful, Sarker, Begum, Samad, (2022), also revealed that more people (98.65%) who engage in poultry farming especially in a commercia; scale engage in layer farming for egg production.

**Table 4.1: Socio-Economic Characteristics of Respondents, n = 119**

Socio-Economic Characteristics		Frequency	%
Age of Respondents	21 - 30years	26	21.8

	31 - 40years	31	26.1
	41 - 50years	34	28.6
	51 - 60years	20	16.8
	61 - 70years	5	4.2
	71 years above	3	2.5
Sex of respondents	Female	56	47.1
	Male	63	52.9
Marital Status	Single	30	25.2
	Married	64	53.8
	Divorced	14	11.8
	Widowed	11	9.2
Educational Qualification	No formal education	14	11.8
	Primary Education	12	10.1
	Secondary Education	16	13.4
	OND/HND	17	14.3
	NCE	8	6.7
	B.Sc.	36	30.3
	M.Sc.	11	9.2
	Ph.D.	5	4.2
Family Size	1-3 person	68	57.1
	4-6 person	42	35.3
	7-9 person	7	5.9
	10 person Above	2	1.9
Farm Experience	1 to 3years	38	31.9
	4 to 6years	68	57.1
	7 to 9years	8	6.7
	over 10years	5	4.2
Farm Size	100-500 birds	23	19.3

	501-1000 birds	29	24.4
	1001-1500 birds	34	28.6
	1501-2000 birds	18	15.1
	Over 2001 birds	15	12.6
Income Per Season	1-3million Naira	5	4.2
	4-6million	91	76.5
	7-9million	9	7.6
	Over 10million	4	3.4
Source of Labour	Family	81	68.1
	Hired	21	17.6
	Mechanized	16	13.4
Type of Poultry Farming	Layers	5	4.4
	Boilers	75	63.2
	Mixed Farming	39	32.4

*Researcher's Survey 2025*

## **4.2 POULTRY FARMING TECHNOLOGIES AVAILABLE**

The result from Table 4.2 show that Automatic feeders is not available to the poultry farmers, this is indicated by the majority of farmers (73.9%). The findings hers agree with Madane, Patil, Nainwad, Kabadage, and Kumbhar (2019), who reveal that Automatic Feeder is not widely used by Poultry Farmers due to the problem of power failure which prevents the feeders from working. Those who adopt Automatic Feeders receive the benefits than those who have not been able to solve the power issue. Also, Ogbuka, Anoliefo, Ajibo, and Ogbuka, (2021) in their study conducted research for subsistent poultry farmers, and found that automatic feeding system is necessary for remedying the current challenges associated with poultry farming especially as it regards the high cost associated with personnel. It was

noted that automatic feeding system is more effective as it saves both time and energy as well as reduces personnel cost (Ogbuka, Anoliefo, Ajibo, and Ogbuka, 2021), but most farmers are yet to adopt it fully. On the other hand, Incubators (67.2%), Health monitoring tools (52.5%), LED lighting system (89.1%), Poultry vaccination systems (80.7%), Automated manure management (68.1%) were all found to not be available to the poultry farmer. However, Water systems (69.7%), Disease control systems (79.8%) Egg collection and grading machine (52.9%) and Biosecurity system (73.1%) were found to be available to the poultry farmers. This supports the points buttressed by Ajuwa, Elenwa, and Isife, (2024) who ranked watering system (78.7%) as the first to be available to poultry farmers, this is due to the importance of water in poultry farming, while Biosecurity system was ranked third. Olanrewaju, Akintunde, Popoola, Busari, and Omotosho (2023) aver that utilizing digital technologies in poultry farming provides huge significance for up-scaling poultry enterprises for optimized efficiency and productivity.

**Table 4.2: Please indicate whether the following technologies are available on your farm:**

S/N	Information Source	Response	Frequency	Percentage
1	Automatic feeders	Available	31	26.1
		Not Available	88	73.9
2	Water systems	Available	83	69.7
		Not Available	36	30.3
3	Incubators	Available	39	32.8
		Not Available	80	67.2
4	Disease control systems	Available	95	79.8
		Not Available	24	20.2
5	Health monitoring tools	Available	57	47.5
		Not Available	62	52.5

6	LED lighting system	Available	13	10.9
		Not Available	106	89.1
7	Egg collection and grading machine	Available	63	52.9
		Not Available	56	47.1
8	Poultry vaccination systems	Available	23	19.3
		Not Available	96	80.7
9	Biosecurity system	Available	87	73.1
		Not Available	32	26.9
10	Automated manure management	Available	38	31.9
		Not Available	81	68.1

*Researcher's Survey 2025*

#### **4.3 AWARENESS OF POULTRY FARMING TECHNOLOGIES:**

From table 4.3, it was revealed that poultry farmers are aware of some poultry farming technologies, while they are not aware of others. This is also the opinion of Ajuwa, Elenwa, and Isife, (2024) who noted that majority (84%) of the respondents were aware of automated feeding system which ranked first, but only about half (50.7%) were aware of health monitoring system. This means some technologies are more known to farmers than others. The respondents in this study indicated that they are aware of Automatic feeders (86.5%), Water systems (94.1%), Incubators (73.1%), Egg collection and grading machine (51.3%), Poultry vaccination systems (89.1%), and Biosecurity system (57.1%). However, it was found that the farmers are not aware of Disease control systems (62.2%), Health monitoring tools (54.6%), LED lighting system (74.8%), and Automated manure management (66.4%). Olanrewaju, Akintunde, Popoola, Busari, and Omotosho (2023) supports this finding when he stated that some farmers had good knowledge of the use of

blockchain for tracking products along the supply chain, artificial intelligence for machine learning and sensors for collecting and analyzing air, water, etc., while other do not.

**Table 4.3: Are you aware of the following poultry farming technologies?**

S/N	Information Source	Response	Frequency	Percentage
1	Automatic feeders	Yes	103	86.5
		No	16	13.4
2	Water systems	Yes	112	94.1
		No	7	5.9
3	Incubators	Yes	87	73.1
		No	32	26.9
4	Disease control systems	Yes	45	37.8
		No	74	62.2
5	Health monitoring tools	Yes	54	43.7
		No	65	54.6
6	LED lighting system	Yes	30	25.2
		No	89	74.8
7	Egg collection and grading machine	Yes	61	51.3
		No	58	48.7
8	Poultry vaccination systems	Yes	106	89.1
		No	13	10.9
9	Biosecurity system	Yes	68	57.1
		No	51	42.9
10	Automated manure management	Yes	40	33.6
		No	79	66.4

*Researcher's Survey 2025*

#### **4.4 SOURCES OF INFORMATION ON POULTRY FARMING TECHNOLOGIES**

Table 4.4 reveal the source of information for the poultry farmers, it was revealed majority of the farmer get information from Radio (79.3%), Internet (69.7%), Mobile Phone (67.2%), Television (94.4%), Friends (63.9%), Relatives (79.3%), and Extension Agents (89.1%). on the other hand, it was revealed that only Neighbours (52.1%,) is not a popular source of information for the poultry farmers. This agrees with the findings of Ifabiyi, Banjoko, and Shuaib, (2023) who found that the internet is a broad library of information utilized by farmers. They added that this can come through several channels especially the social media platform or website. Ijatuyi (2016) added that mobile phones, radio and professional colleagues were most useful sources of information for farmers. In line with this, Obazi, Dimelu, Chukwueze, (2022) revealed that poultry farmers can get their information from different sources, but fellow farmers which account for 96.6% is the major source of information. However, it is important to note that there are different kind of information that can be sourced by farmers from the different channels (Obazi, Dimelu, Chukwueze, 2022). In the opinion of Adi, Yohannes, and Minas (2020) agricultural information is crucial only when it is accessible and need based. Access and use of agricultural information is imperative to making rational decision, reduce uncertainty, and enhance adoption of farm innovation and production. Amurtiya, (2022) added that Information is a critical factor in the farming business. It is however sad that most farmers do not get adequate information for their specific needs (Obazi, Dimelu, Chukwueze, 2022)

**Table 4.4: How do you get information on poultry farming technologies? (Check all that apply)**

S/N	Information Source	Response	Frequency	Percentage
1	Radio	Yes	95	79.3
		No	24	20.2
2	Internet	Yes	83	69.7

		No	36	30.3
3	Mobile Phone	Yes	80	67.2
		No	39	32.8
4	Television	Yes	88	94.4
		No	31	26.6
5	Neighbours	Yes	57	47.9
		No	62	52.1
6	Friends	Yes	76	63.9
		No	43	36.1
7	Relatives	Yes	23	19.3
		No	96	80.7
8	Extension Agents	Yes	106	89.1
		No	13	11.9

*Researcher's Survey 2025*

#### **4.5 LEVEL OF ADOPTION OF POULTRY FARMING TECHNOLOGIES:**

The data shown in Table 4.5 revealed that Automatic feeders is not commonly used by poultry famers, the mean score of 2.37 reveal this, Health monitoring tools with a mean score of 2.35, LED lighting system with a mean score of 2.24, and Biosecurity system with a mean score of 1.97 are all not commonly used by poultry farmers. On the other hand, the table reveals that Water systems with a mean score of 2.71, Incubators with a mean score of 3.04, Disease control systems with a mean score of 2.91, Egg collection and grading machine with a mean score of 3.72, and Poultry vaccination systems with a mean score of 2.87, Automated manure management with a mean score of 2.88 are commonly used and adopted by the poultry farmers. This study supports the view of Madane, Patil, Nainwad, Kabadage, and Kumbhar (2019), who reveal that Automatic Feeder is not widely used by Poultry Farmers due to the problem of power failure which prevents the feeders from

working. Ogbuka, Anoliefo, Ajibo, and Ogbuka, (2021) added that though automatic feeding system is necessary for remedying some poultry challenges, it is still not widely used by most farmers, this can be due to cost of setup or power problem. In the aspect of watering system, Ajuwa, Elenwa, and Isife, (2024) noted it is the most adopted poultry technology.

**Table 4.5: How often do you use the following technologies on your farm?**

S/N	Technology	Response	Frequency	Percentage (%)	Mean
1	Automatic feeders	Never used	27	22.7	<b>2.37</b>
		Rarely used	34	28.6	
		Sometimes used	38	31.9	
		Regularly used	20	16.8	
2	Water systems	Never used	37	31.1	<b>2.71</b>
		Rarely used	36	30.3	
		Sometimes used	25	21.0	
		Regularly used	21	17.6	
3	Incubators	Never used	54	45.4	<b>3.04</b>
		Rarely used	32	26.9	
		Sometimes used	24	20.2	
		Regularly used	9	7.6	
4	Disease control systems	Never used	29	24.4	<b>2.91</b>
		Rarely used	41	34.5	
		Sometimes used	32	26.9	
		Regularly used	17	14.3	
5	Health monitoring tools	Never used	25	21.0	<b>2.35</b>
		Rarely used	29	24.4	
		Sometimes used	48	40.3	
		Regularly used	17	14.3	
6	LED lighting system	Never used	18	15.1	<b>2.24</b>
		Rarely used	27	22.7	

		Sometimes used	61	51.2	
		Regularly used	13	10.9	
7	Egg collection and grading machine	Never used	42	35.3	
		Rarely used	50	42.0	<b>3.72</b>
		Sometimes used	13	10.9	
		Regularly used	14	11.8	
8	Poultry vaccination systems	Never used	38	31.9	
		Rarely used	38	31.9	<b>2.87</b>
		Sometimes used	23	19.3	
		Regularly used	20	16.8	
9	Biosecurity system	Never used	21	17.6	
		Rarely used	44	37.0	<b>1.97</b>
		Sometimes used	30	25.2	
		Regularly used	24	20.2	
10	Automated manure management	Never used	22	18.5	
		Rarely used	17	14.3	<b>2.88</b>
		Sometimes used	38	31.9	
		Regularly used	42	35.3	

*Researcher's Survey 2025*

#### **4.6 PERCEIVED BENEFITS OF USING POULTRY FARMING TECHNOLOGIES:**

The data shown in Table 4.6 revealed that there are some benefits which can be derived from the use of technologies they include increased productivity (mean score = 3.12), Time savings (mean score = 2.66), Disease prevention (mean score = 2.62) Improved animal welfare (mean score = 2.84) Increased profitability (mean score = 2.54) and Enhanced food safety (mean score = 2.54). On the other hand, it was found that Cost reduction (mean score = 2.07) Reduced mortality rate (mean score = 2.31) Environmental sustainability (mean score = 2.13), Improved bird health (mean score = 2.04) are not benefits derived from using

technology in poultry farming. In the opinion of Ogumbiyi and Ojo (2018) there are several benefits which farmers can derive from adopting poultry technologies. Ajuwa, Elenwa, and Isife, (2024) agrees with this study and writes that some of the benefits include helps in data-driven decision making ( $\bar{x}= 3.03$ ), contribute to increased production and productivity ( $\bar{x}= 3.05$ ) and increased scalability and profitability ( $\bar{x}= 3.01$ ). Corredor (2024) noted that technology is of immense benefit to the poultry farmers, this has given rise to the term Aviculture which refers to the use of smart technologies to optimize poultry production. The author added that one of such benefit is the fact that Farmers can now monitor their poultry operations from anywhere using mobile apps or web interfaces (Corredor 2024). Taleb, et al (2025) revealed that Technology solutions have been proposed to address the challenges faced by poultry, they authors added that it is a veritable tool in addressing labor shortages and animal welfare, while improving productivity and profitability.

**Table 4.6: To what extent do you agree with the following statements about the benefits of using technologies?**

S/N	Benefits	Response	Frequency	Percentage (%)	Mean
1	Increased productivity	Strongly disagree	20	16.8	
		Disagree	26	21.8	<b>3.12</b>
		Neutral	10	8.4	
		Agree	9	7.6	
		Strongly Agree	54	45.4	
2	Cost reduction	Strongly disagree	41	34.5	
		Disagree	30	25.2	
		Neutral	12	10.1	<b>2.07</b>
		Agree	16	13.4	
		Strongly Agree	20	16.8	

3	Time savings	Strongly disagree	14	11.8	
		Disagree	30	25.2	
		Neutral	3	2.5	<b>2.66</b>
		Agree	40	33.6	
		Strongly Agree	32	26.9	
4	Disease prevention	Strongly disagree	21	17.6	
		Disagree	44	36.9	
		Neutral	30	25.3	<b>2.62</b>
		Agree	10	8.4	
		Strongly Agree	14	11.8	
5	Reduced mortality rate	Strongly disagree	15	12.6	
		Disagree	17	14.3	
		Neutral	7	3.9	<b>2.31</b>
		Agree	38	31.9	
		Strongly Agree	42	35.3	
6	Improved animal welfare	Strongly disagree	19	15.9	
		Disagree	30	25.2	
		Neutral	8	6.7	<b>2.84</b>
		Agree	9	7.6	
		Strongly Agree	53	44.5	
7	Increased profitability	Strongly disagree	32	26.9	
		Disagree	17	14.3	
		Neutral	4	3.4	<b>2.54</b>
		Agree	60	50.4	
		Strongly Agree	6	5.0	
8	Environmental sustainability	Strongly disagree	12	10.1	
		Disagree	26	21.8	
		Neutral	11	9.2	<b>2.13</b>
		Agree	37	31.1	
		Strongly Agree	36	30.3	

9	Enhanced food safety	Strongly disagree	32	26.9	
		Disagree	6	5.0	
		Neutral	21	17.6	<b>2.54</b>
		Agree	21	17.6	
		Strongly Agree	39	32.8	
10	Improved bird health	Strongly disagree	48	40.3	
		Disagree	26	21.8	
		Neutral	12	10.1	<b>2.04</b>
		Agree	16	13.4	
		Strongly Agree	20	16.8	

*Researcher's Survey 2025*

#### **4.7 FACTORS MILITATING AGAINST THE USE OF POULTRY FARMING TECHNOLOGIES:**

It was revealed as presented in Table 4.7 that there are Factors Militating against the of Poultry Farming Technologies, some of the major factors include Cost of technology (mean = 3.06), Market fluctuations (mean = 3.02), and Access to credit (mean = 2.99), on the other hand it was found that High energy costs (mean = 2.39), and Disease outbreak (mean = 2.43) are not serious problems for poultry farmers. This study agrees with Ajuwa, Elenwa, and Isife, (2024) who explained that high investment cost, limited access to finance, infrastructural limitation are the major challenges militating against the use of poultry farming technologies. Anosike, Rekwot, Owoshagba, Ahmed, and Atiku, (2018) are of the opinions that the challenges faced by poultry farmers in adopting technology is also a challenge that limit the production capacity and output of the poultry farmer. The study however disagrees with Özentürk, Chen, Jamone, Versace, (2024) who explained that the most common challenges in Poultry Farming Technologies adoption disease outbreaks, welfare regulations, and environmental factors which affect production practices. However,

Park et al., (2022) emphasized the important of technology in poultry farming which can offer superior accuracy, consistency, and efficiency in monitoring birds and their environment. Gittins et al., (2020) added that technology can contribute to increased biosecurity and reduced human-animal interactions in poultry houses, as they reduce the need for frequent human intervention. This suggest that no matter the challenges, adoption of technology in poultry farming should be promoted. Beyond the findings in this study Abdullah, and Samah (2024) stated that farmers’ perceptions and levels of education, as well as extension-workers’ knowledge, are all factors that affect technology adoption among farmers.

**Table 4.7: Factors Militating Against the Use of Poultry Farming Technologies:**

S/N	Factors	Response	Frequency	Percentage (%)	Mean
1	Cost of technology	Very Serious	54	45.4	<b>3.06</b>
		Serious	36	30.3	
		Not Serious	22	18.5	
		Not a Problem	7	5.9	
2	Access to credit	Very Serious	65	54.6	<b>2.99</b>
		Serious	30	25.2	
		Not Serious	17	14.3	
		Not a Problem	7	5.9	
3	Technical knowledge	Very Serious	50	42.0	<b>2.76</b>
		Serious	39	32.8	
		Not Serious	22	18.5	
		Not a Problem	8	6.7	
4	Poor infrastructure	Very Serious	42	35.3	<b>2.67</b>
		Serious	46	38.7	
		Not Serious	23	19.3	
		Not a Problem	8	6.7	

5	Lack of Awareness	Very Serious	36	30.3	
		Serious	37	31.1	<b>2.58</b>
		Not Serious	38	31.9	
		Not a Problem	8	6.7	
6	Disease outbreak	Very Serious	21	17.6	
		Serious	35	29.4	<b>2.43</b>
		Not Serious	33	27.7	
		Not a Problem	30	25.2	
7	High energy costs	Very Serious	20	16.8	
		Serious	28	23.5	<b>2.39</b>
		Not Serious	35	29.4	
		Not a Problem	36	30.2	
8	Limited government support	Very Serious	77	64.7	
		Serious	30	25.2	<b>2.97</b>
		Not Serious	7	5.9	
		Not a Problem	5	4.2	
9	Inadequate maintenance and repair services	Very Serious	56	47.0	
		Serious	19	16	<b>2.89</b>
		Not Serious	29	24.3	
		Not a Problem	15	12.6	
10	Market fluctuations	Very Serious	76	63.9	
		Serious	15	12.6	<b>3.02</b>
		Not Serious	12	10.1	
		Not a Problem	16	13.4	

*Researcher's Survey 2025*

#### **4.8 TEST OF HYPOTHESIS ONE**

Hypothesis one states that there is no significant relationship between the socio-economic characteristics of poultry farmers and level adoption of poultry farming technologies in the Study Area

#### **4.8.1 Sex**

The Pearson chi square test show that there is no significant relationship between the sex and the level of adoption of poultry farming technologies by poultry farmers. The p value was .918 which is greater than the significant alpha value of 0.05. The implication of this is that the sex of the poultry farmer does not affect or determine the level of adoption of poultry farmers.

#### **4.8.2 Age**

The Pearson chi square test show that there is no significant relationship between the age and the level of adoption of poultry farming technologies by poultry farmers. The p value was .801 which is greater than the significant alpha value of 0.05. The implication of this is that the age of the poultry farmer does not affect or determine the level of adoption of poultry farmers.

#### **4.8.3 Marital Status**

The Pearson chi square test show that there is no significant relationship between Marital Status and the level of adoption of poultry farming technologies by poultry farmers. The p value was .886 which is greater than the significant alpha value of 0.05. The implication of this is that the marital status of the poultry farmer does not affect or determine the level of adoption of poultry farmers.

#### **4.8.4 Level of Education**

The Pearson chi square test show that there is a strong significant relationship between the Level of Education and the level of adoption of poultry farming technologies by poultry farmers. The p value was .000 which is lesser than the significant alpha value of 0.05. The implication of this is that the level of education of the poultry farmer goes a long way to affect or determine the level of adoption of poultry farmers. A more educated farmer would know and appreciate technology better.

#### **4.8.5 Family Size of Respondents**

The Pearson chi square test show that there is no significant relationship between Family Size and the level of adoption of poultry farming technologies by poultry farmers. The p value was .886 which is greater than the significant alpha value of 0.05. The implication of this is that the Family Size of the poultry farmer does not affect or determine the level of adoption of poultry farmers.

#### **4.8.6 Farming experience**

The Pearson chi square test show that there is a strong significant relationship between Farming experience and the level of adoption of poultry farming technologies by poultry farmers. The p value was .107 which is lesser than the significant alpha value of 0.05. The implication of this is that the Farming experience of the poultry farmer goes a long way to affect or determine the level of adoption of poultry farmers.

#### **4.8.7 Farm Size**

The Pearson chi square test show that there is a strong significant relationship between Farm Size and the level of adoption of poultry farming technologies by poultry farmers. The p value was .011 which is lesser than the significant alpha value of 0.05. The implication of this is that the Farm Size of the poultry farmer goes a long way to affect or

determine the level of adoption of poultry farmers. A farmer in a large farm is more likely to adopt technology than a farmer with a small farm.

#### **4.8.8 Income Per Season**

The Pearson chi square test shows that there is a strong significant relationship between Income Per Season and the level of adoption of poultry farming technologies by poultry farmers. The p value was .011 which is lesser than the significant alpha value of 0.05. The implication of this is that the Income Per Season of the poultry farmer goes a long way to affect or determine the level of adoption of poultry farmers. The higher the income of a farmer the more likely they can afford technological tools for their farm operations.

#### **4.8.9 Source of Labour**

The Pearson chi square test shows that there is no significant relationship between Source of Labour and the level of adoption of poultry farming technologies by poultry farmers. The p value was .511 which is greater than the significant alpha value of 0.05. The implication of this is that the Source of Labour of the poultry farmer does not affect or determine the level of adoption of poultry farmers.

#### **4.8.10 Type of Poultry Farming**

The Pearson chi square test shows that there is no significant relationship between Type of Poultry Farming and the level of adoption of poultry farming technologies by poultry farmers. The p value was .702 which is greater than the significant alpha value of 0.05. The implication of this is that the Type of Poultry Farming does not affect or determine the level of adoption of poultry farmers.

**CHI SQUARE TABLE:** Chi-Square Analysis on the relationship between the socio-economic characteristics of poultry farmers and level adoption of poultry farming technologies in the Study Area

**Table 4.8 chi square table**

<b>Socio Economic Variable</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>p-value</b>	<b>Decision</b>
Age	213.846 <sup>a</sup>	3	.918	Not Significant
Sex	98.241 <sup>a</sup>	14	.801	Not Significant
Marital Status	58.763 <sup>a</sup>	5	.886	Not Significant
Educational qualification	435.092 <sup>a</sup>	5	.000	Significant
Family Size	167.526 <sup>a</sup>	10	.886	Not Significant
Farming experience	302.185 <sup>a</sup>	3	.007	Significant
Farm Size	176.904 <sup>a</sup>	1	.011	Significant
Income Per Season	120.489 <sup>a</sup>	6	.011	Significant
Source of Labour	50.637 <sup>a</sup>	5	.511	Not Significant
Type of Poultry Farming	312.483 <sup>a</sup>	5	.702	Not Significant

*Significant at  $p < 0.05$  (less than 0.05)*

#### **4.9 HYPOTHESIS TWO**

There is no significant relationship between the socio-economic characteristics of poultry farmers and sources of information on poultry farming technologies

##### **4.9.1 Sex**

The Pearson chi square test show that there is no significant relationship between the sex and the sources of information on poultry farming technologies. The p value was 0.740 which is greater than the significant alpha value of 0.05. The implication of this is that the sex of the poultry farmer does not affect or determine the sources of information on poultry farming technologies

#### **4.9.2 Age**

The Pearson chi square test show that there is no significant relationship between the age and the sources of information on poultry farming technologies. The p value was 0.320 which is greater than the significant alpha value of 0.05. The implication of this is that the age of the poultry farmer does not affect or determine the sources of information on poultry farming technologies.

#### **4.9.3 Marital Status**

The Pearson chi square test show that there is no significant relationship between Marital Status and the sources of information on poultry farming technologies. The p value was 0.960 which is greater than the significant alpha value of 0.05. The implication of this is that the marital status of the poultry farmer does not affect or determine the sources of information on poultry farming technologies.

#### **4.9.4 Level of Education**

The Pearson chi square test show that there is a strong significant relationship between the Level of Education and the sources of information on poultry farming technologies. The p value was .002 which is lesser than the significant alpha value of 0.05. The implication of this is that the level of education of the poultry farmer goes a long way to affect or determine the sources of information on poultry farming technologies.

#### **4.9.5 Family Size of Respondents**

The Pearson chi square test show that there is no significant relationship between Family Size and the sources of information on poultry farming technologies. The p value was 0.120 which is greater than the significant alpha value of 0.05. The implication of this is

that the Family Size of the poultry farmer does not affect or determine sources of information on poultry farming technologies.

#### **4.9.6 Farming experience**

The Pearson chi square test show that there is a strong significant relationship between Farming experience and the sources of information on poultry farming technologies. The p value was 0,048 which is lesser than the significant alpha value of 0.05. The implication of this is that the Farming experience of the poultry farmer goes a long way to affect or determine the sources of information on poultry farming technologies.

#### **4.9.7 Farm Size**

The Pearson chi square test show that there is a strong significant relationship between Farm Size and the sources of information on poultry farming technologies. The p value was .010 which is lesser than the significant alpha value of 0.05. The implication of this is that the Farm Size of the poultry farmer goes a long way to affect or determine the sources of information on poultry farming technologies.

#### **4.9.8 Income Per Season**

The Pearson chi square test show that there is no relationship between Income Per Season and the sources of information on poultry farming technologies. The p value was .0459 which is lesser than the significant alpha value of 0.05. The implication of this is that the Income Per Season of the poultry farmer goes a long way to affect or determine the sources of information on poultry farming technologies.

#### **4.9.9 Source of Labour**

The Pearson chi square test show that there is no significant relationship between Source of Labour and the sources of information on poultry farming technologies. The p

value was 0.154 which is greater than the significant alpha value of 0.05. The implication of this is that the Source of Labour of the poultry farmer does not affect or determine the sources of information on poultry farming technologies.

#### 4.9.10 Type of Poultry Farming

The Pearson chi square test show that there is no significant relationship between Type of Poultry Farming and the sources of information on poultry farming technologies. The p value was 0.081 which is greater than the significant alpha value of 0.05. The implication of this is that the Type of Poultry Farming does not affect or determine the sources of information on poultry farming technologies.

**Table 4.9 CHI SQUARE TABLE:** Chi- Square Analysis on the relationship between the socio-economic characteristics of poultry farmers and sources of information on poultry farming technologies

<b>Socio Economic Variable</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>p-value</b>	<b>Decision</b>
Age	157.932 <sup>a</sup>	21	0.740	Not Significant
Sex	45.367 <sup>a</sup>	18	0.320	Not Significant
Marital Status	78.205 <sup>a</sup>	7	0.960	Not Significant
Educational qualification	134.756 <sup>a</sup>	4	0.002	Significant
Family Size	167.526 <sup>a</sup>	5	0.120	Not Significant
Farming experience	232.401 <sup>a</sup>	5	0.048	Significant
Farm Size	98.104 <sup>a</sup>	13	0.010	Significant
Income Per Season	110.536 <sup>a</sup>	7	0.459	Not Significant
Source of Labour	122.539 <sup>a</sup>	4	0.154	Not Significant
Type of Poultry Farming	55.220 <sup>a</sup>	15	0.081	Not Significant

***Significant at  $p < 0.05$  (less than 0.05)***

#### **4.10 HYPOTHESIS THREE**

There is no significant relationship between the socio-economic characteristics of poultry farmers and perceived benefits of using poultry farming technologies.

##### **4.10.1 Sex**

The Pearson chi square test show that there is no significant relationship between the sex and the perceived benefits of using poultry farming technologies. The p value was 0.503 which is greater than the significant alpha value of 0.05. The implication of this is that the sex of the poultry farmer does not affect or determine the perceived benefits of using poultry farming technologies

##### **4.10.2 Age**

The Pearson chi square test show that there is no significant relationship between the age and the perceived benefits of using poultry farming technologies. The p value was 0.210 which is greater than the significant alpha value of 0.05. The implication of this is that the age of the poultry farmer does not affect or determine the perceived benefits of using poultry farming technologies.

##### **4.10.3 Marital Status**

The Pearson chi square test show that there is no significant relationship between Marital Status and the perceived benefits of using poultry farming technologies. The p value was 0.789 which is greater than the significant alpha value of 0.05. The implication of this is that the marital status of the poultry farmer does not affect or determine the perceived benefits of using poultry farming technologies

##### **4.10.4 Level of Education**

The Pearson chi square test show that there is a strong significant relationship between the Level of Education and the perceived benefits of using poultry farming technologies. The p value was .015 which is lesser than the significant alpha value of 0.05. The implication of this is that the level of education of the poultry farmer goes a long way to affect or determine the perceived benefits of using poultry farming technologies.

#### **4.10.5 Family Size of Respondents**

The Pearson chi square test show that there is no significant relationship between Family Size and the perceived benefits of using poultry farming technologies. The p value was 0.0463 which is greater than the significant alpha value of 0.05. The implication of this is that the Family Size of the poultry farmer does not affect or determine perceived benefits of using poultry farming technologies.

#### **4.10.6 Farming experience**

The Pearson chi square test show that there is no relationship between Farming experience and the perceived benefits of using poultry farming technologies. The p value was 0.928 which is greater than the significant alpha value of 0.05. The implication of this is that the Farming experience of the poultry farmer goes a long way to affect or determine the perceived benefits of using poultry farming technologies.

#### **4.10.7 Farm Size**

The Pearson chi square test show that there is a strong significant relationship between Farm Size and the perceived benefits of using poultry farming technologies. The p value was .018 which is lesser than the significant alpha value of 0.05. The implication of this is that the Farm Size of the poultry farmer goes a long way to affect or determine the perceived benefits of using poultry farming technologies.

#### 4.10.8 Income Per Season

The Pearson chi square test show that there is no relationship between Income Per Season and the perceived benefits of using poultry farming technologies. The p value was .0.247 which is greater than the significant alpha value of 0.05. The implication of this is that the Income Per Season of the poultry farmer goes a long way to affect or determine the perceived benefits of using poultry farming technologies.

#### 4.10.9 Source of Labour

The Pearson chi square test show that there is a significant relationship between Source of Labour and the perceived benefits of using poultry farming technologies. The p value was 0.022 which is lesser than the significant alpha value of 0.05. The implication of this is that the Source of Labour of the poultry farmer does not affect or determine the perceived benefits of using poultry farming technologies.

#### 4.10.10 Type of Poultry Farming

The Pearson chi square test show that there is no significant relationship between Type of Poultry Farming and the perceived benefits of using poultry farming technologies. The p value was 0.108 which is greater than the significant alpha value of 0.05. The implication of this is that the Type of Poultry Farming does not affect or determine the perceived benefits of using poultry farming technologies.

**Table 4.10 CHI SQUARE TABLE:** Chi- Square Analysis on the relationship between the socio-economic characteristics of poultry farmers and perceived benefits of using poultry farming technologies

<b>Socio Economic Variable</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>p-value</b>	<b>Decision</b>
Age	92.158 <sup>a</sup>	4	0.503	Not Significant
Sex	120.451 <sup>a</sup>	3	0.210	Not Significant
Marital Status	67.246 <sup>a</sup>	6	0.789	Not Significant

Educational qualification	151.394 <sup>a</sup>	5	0.015	Significant
Family Size	90.323 <sup>a</sup>	5	0.463	Not Significant
Farming experience	77.103 <sup>a</sup>	4	0.928	Not Significant
Farm Size	43.280 <sup>a</sup>	2	0.018	Significant
Income Per Season	88.206 <sup>a</sup>	7	0.247	Not Significant
Source of Labour	132.576 <sup>a</sup>	6	0.022	Significant
Type of Poultry Farming	113.451 <sup>a</sup>	5	0.108	Not Significant

*Significant at  $p < 0.05$  (less than 0.05)*

#### **4.11 HYPOTHESIS FOUR**

There is no significant relationship between the socio-economic characteristics of poultry farmers and factors militating against the use of poultry farming technologies by poultry farmers.

##### **4.11.1 Age**

The Pearson chi square test show that there is no significant relationship between the age and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was 0.758 which is greater than the significant alpha value of 0.05. The implication of this is that the age of the poultry farmer does not affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

##### **4.11.2 Sex**

The Pearson chi square test show that there is a significant relationship between the sex and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was 0.039 which is lesser than the significant alpha value of 0.05. The

implication of this is that the sex of the poultry farmer does not affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.3 Marital Status**

The Pearson chi square test show that there is no significant relationship between Marital Status and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was 0.196 which is greater than the significant alpha value of 0.05. The implication of this is that the marital status of the poultry farmer does not affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.4 Level of Education**

The Pearson chi square test show that there is a strong significant relationship between the Level of Education and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was .0.042 which is lesser than the significant alpha value of 0.05. The implication of this is that the level of education of the poultry farmer goes a long way to affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.5 Family Size of Respondents**

The Pearson chi square test show that there is no significant relationship between Family Size and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was 0.612 which is greater than the significant alpha value of 0.05. The implication of this is that the Family Size of the poultry farmer does not affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.6 Farming experience**

The Pearson chi square test show that there is no relationship between Farming experience and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was 0.424 which is greater than the significant alpha value of 0.05. The implication of this is that the Farming experience of the poultry farmer goes a long way to affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.7 Farm Size**

The Pearson chi square test show that there is a strong significant relationship between Farm Size and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was .019 which is lesser than the significant alpha value of 0.05. The implication of this is that the Farm Size of the poultry farmer goes a long way to affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.8 Income Per Season**

The Pearson chi square test show that there is no relationship between Income Per Season and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was .0267 which is greater than the significant alpha value of 0.05. The implication of this is that the Income Per Season of the poultry farmer goes a long way to affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### **4.11.9 Source of Labour**

The Pearson chi square test show that there is a significant relationship between Source of Labour and the perceived benefits of using poultry farming technologies. The p value was 0.011 which is lesser than the significant alpha value of 0.05. The implication of this is that the Source of Labour of the poultry farmer does not affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

#### 4.11.10 Type of Poultry Farming

The Pearson chi square test show that there is no significant relationship between Type of Poultry Farming and the factors militating against the use of poultry farming technologies by poultry farmers. The p value was 0.078 which is greater than the significant alpha value of 0.05. The implication of this is that the Type of Poultry Farming does not affect or determine the factors militating against the use of poultry farming technologies by poultry farmers.

**CHI SQUARE TABLE:** Chi- Square Analysis on the relationship between the socio-economic characteristics of poultry farmers and factors militating against the use of poultry farming technologies by poultry farmers.

<b>Socio Economic Variable</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>p-value</b>	<b>Decision</b>
Age	67.532 <sup>a</sup>	11	0.758	Not Significant
Sex	145.834 <sup>a</sup>	18	0.039	Significant
Marital Status	82.654 <sup>a</sup>	2	0.196	Not Significant
Educational qualification	120.134 <sup>a</sup>	1	0.042	Significant
Family Size	54.210 <sup>a</sup>	16	0.612	Not Significant
Farming experience	89.315 <sup>a</sup>	8	0.424	Not Significant
Farm Size	76.431 <sup>a</sup>	2	0.019	Significant
Income Per Season	66.921 <sup>a</sup>	7	0.267	Not Significant
Source of Labour	115.233 <sup>a</sup>	3	0.011	Significant

---

Type of Poultry Farming	93.512 <sup>a</sup>	9	0.078	Not Significant
-------------------------	---------------------	---	-------	-----------------

*Significant at  $p < 0.05$  (less than 0.05)*

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Summary of findings

The study was conducted to examine the adoption of improved technology to poultry farmers in Ovia North-East LGA, Edo State, Nigeria. The study discussed the socio-economic characteristics of poultry farmers in the study area, the various types of poultry farming technologies, the awareness, the sources, level of adoption, perceived benefits, and the factors militating against the use of poultry farming technologies by poultry farmers. The study found that Agriculture plays a vital role in the life and sustainability of every society; it does not provide food but also create massive employment for the people. In this agricultural sector the Poultry industry has provide to be a major part of the sector as it accounts the cheapest source of animal protein

The majority of the farmers used in this study were young and full of strength with an average age of 42years. Most of these farmers were male, married, and with one form of education or the other. It the study revealed that women also had high interest in poultry farming, though the men were more in numbers but the women take poultry farming as full-time occupation more than the men. The study revealed that the farmers have been in the poultry business for quite some years and therefore possess the necessary experience needed to respond to this study. In addition to this, the average number of birds for the farmers was found to be 2,600. This means they were not small-scale farmers. The annual earnings of 4.2million from the poultry farm shows that the business is a lucrative one. The high earnings is also due to the fact the farmers do not hire labour but uses Family members as their work force. This goes a long way to safe operational cost for the farmer.

It was revealed that Automatic feeders, Incubators, Health monitoring tools, and LED lighting system were not available to the poultry farmers, while Water systems, Disease control systems, and Egg collection and grading machine were found available to the poultry farmers. There were different medium by which the farmers get information, these include Radio, Internet, Television and Mobile Phone. The farmers have adopted technology in their poultry farming in order to attract some benefits like increased productivity, Time savings, and Disease prevention. It is important to note however that some farmers have not fully adopted technology in their operations due to some challenges, these include Cost of technology and Access to credit. It is on this note that some recommendations are made in this study.

## **5.2 Conclusion**

It is the conclusion of this study that the adoption of improved technologies by poultry farmers in Ovia North-East LGA, Edo State, is essential for boosting productivity, enhancing farm profitability, and ensuring sustainable growth in the poultry sector. Despite the potential benefits, various challenges, such as limited access to capital, Cost of technology, and inadequate awareness, hinder the widespread adoption of modern farming practices. However, the study has highlighted that with the right support from government, private sectors, and research institutions, there is significant potential for improved technology to revolutionize poultry farming in the region.

## **5.3 Recommendations**

Based on the findings of this study the following recommendations are made

1. It is essential to increase awareness about the benefits of adopting improved poultry technologies. Farmers need to be educated on the long-term economic benefits of these technologies, including improved productivity and profitability.
2. Extension services should be strengthened to provide continuous training on modern poultry farming techniques, such as biosecurity measures, automated feeding systems, and disease management practices.
3. The government should provide subsidies or financial support to encourage the adoption of advanced poultry farming technologies. This could include access to low-interest loans, grants, or the provision of equipment at subsidized rates.
4. Government policies should focus on reducing the financial barriers to adopting improved technology, particularly for small-scale farmers who may be hesitant due to high initial costs.
5. Establishing partnerships between poultry farmers and research institutions can foster the development and dissemination of locally adapted technologies. These collaborations can help in the development of poultry breeds, disease-resistant strains, and cost-effective feed production technologies suited to the local environment.
6. Rural infrastructure, including roads, electricity, and access to markets, should be improved to enable poultry farmers to efficiently utilize modern technologies. Improved infrastructure will not only support the transportation of technology and inputs but also reduce post-harvest losses by providing better access to markets for selling poultry products.
7. Forming cooperatives or farmer groups can facilitate collective purchasing of technology and inputs, making it more affordable for individual farmers. Through

cooperatives, farmers can share resources, knowledge, and technology, creating a supportive network for the adoption and implementation of improved farming practices.

## REFERENCES

- Abdullah, F.A. and Samah B.A. (2024), Factors Impinging Farmers' Use of Agriculture Technology, 9(3): pp.120-120
- Adi, K., Yohannes, G., & Minas, H. (2020). Access and use of agricultural information in Africa: Conceptual review. *Information and Knowledge Management*, 10 (7), 1-5. DOI: 10.7176/IKM/10-7-01.
- Admin. (2024, November 21). Guide to Poultry Housing Systems: Types and How to choose. *Natural Remedies*. <https://www.naturalremedy.com/blog/housing-system-of-poultry/>
- Agricincome. (2024, September 25). *Poultry farming in Nigeria: Getting started*. Agricincome Hub. <https://agricincome.com/poultry-farming-in-nigeria/>
- AgroNigeria,. (2023, October 3). History of poultry farming in Nigeria - AgroNigeria. *AgroNigeria - AgroNigeria*. <https://agronigeria.ng/history-of-poultry-farming-in-nigeria/>
- Ahmadu, J., & Okoror, O. (2019). *Analysis of food security status of farmers in Ovia North-East Local Government Area, Edo State, Nigeria*. <https://www.ajol.info/index.php/afsjg/article/view/193116>
- Ajuwa, H. A., Elenwa, C.O. and Isife, B. I (2024), Adoption of Poultry Farming Technologies for Increased Poultry Production in Yenagoa Local Government Area, Bayelsa state, *International Journal of Agriculture and Earth Science*, Vol 10. No. 5
- Ajzen, I. (1991b). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-t](https://doi.org/10.1016/0749-5978(91)90020-t)
- Akanni, I.A., 2007. “Effect of micro-Finance on Small Scale Poultry business in South Western Nigeria” *Emirate Journal of Food and Agriculture*. 19(2): 38-47 <http://www.cfa.uaeu.ac.ae>
- Akomolafe, A. M., Akin-Olagunju, O. A., & Yusuf, S. A. (2021). Effects of information and communication Technologies use on technical efficiency of poultry egg production in Ibadan, Oyo State, Nigeria. *AgEcon Search*. <https://doi.org/10.22004/ag.econ.347374>
- Albert U. O., David E. I. & Bishop O. O. ( 2020) Child Labor in Agricultural Production and Socioeconomic Variables among Arable Farming Households in Nigeria. *Journal of Rural Social Sciences*, 29 (2), 67–81

- Ali, R. S., & Ali, R. S. (2024, November 1). FG releases 2 new chicken breeds, 14 new crop varieties - NEWS AGENCY OF NIGERIA. *NEWS AGENCY OF NIGERIA - Africa's Media Giant*. <https://nannews.ng/2024/11/01/fg-releases-2-new-chicken-breeds-14-new-high-yield-crop-varieties/>
- Amurtiya, M (2022) Analysis of poultry farmers' information needs in Adamawa State, Nigeri, *Agricultura Tropica Et Subtropica*, pp.1-9
- Anosike, F.U., Rekwot, G.Z., Owoshagba, O.B., Ahmed, S. and Atiku, J.A (2018), Challenges of poultry production in Nigeria: A Review, *Nigeria Journal of Animal Production*, 45(1): pp.252 – 258
- Ao, G., Liu, Q., Qin, L., Chen, M., Liu, S., & Wu, W. (2021). Organization model, vertical integration, and farmers' income growth: Empirical evidence from large-scale farmers in Lin'an, China. *PLoS One*, 16(6), e0252482. <https://doi.org/10.1371/journal.pone.0252482>
- Assessing Technological Adoption in the Poultry Industry – Poultry Producer <https://www.poultryproducer.com/assessing-technological-adoption-in-the-poultry-industry/>
- Bello, O.G, Abdulraham, O.L, Kayode, A.O, Busari, I.Z &Koloche, I.M. (2022). Awareness of Poultry Farmers on Biosafety practices against infectious disease in Kano State, Nigeria. *Journal of Agricultural Extension*, 26 (2): 1:11
- Birhanu, M. Y., Bruno, J. E., Alemayehu, T., Esatu, W., Geremew, K., Yemane, T., Kebede, F. G., & Dessie, T. (2022). Beyond diffusion to sustained adoption of innovation: A case of smallholder poultry development in sub-Saharan Africa. *International Journal of Agricultural Sustainability*, 20(6), 1028–1046. <https://doi.org/10.1080/14735903.2022.2041235>
- C.O. Osuagwu, Anosike, C, Ahaotu, E. O and Oko, E.C, “Factors Attributed to Low Aquaculture Production in the Copperbelt Province of Zambia: A Case Study of Kitwe and Chingola Districts”, *International Journal of Research in Agriculture and Forestry*, 7(9), 2020, pp. 14-21 <https://www.ijraf.org/papers/v7-i9/3.pdf>
- Chen, P. J., O’Sullivan, S., & Pyke, S. (2024). Hybrid governance and welfare standards for broiler chickens raised for human consumption. *Australian Journal of Public Administration*, 1–24. <https://doi.org/10.1111/1467-8500.12625>
- Chiemeke SC (2024). Smart Cities and Emerging Technologies. Lead Paper Presentation at the 5th Scientific Conference of the Nigeria Academy of Science, 24th January 2024. Available at <https://www.nas.org.ng>
- Corredor, D (2024) The role of technology in ensuring sustainable poultry production, retrieved from <https://avinews.com/en/the-role-of-technology-in-ensuring-sustainable-poultry-production>, accessed on 26th February, 2025

- D'Amato A, Mazzanti M, Nicolli F (2021) Green technologies and environmental policies for sustainable development: testing direct and indirect impacts. *J Clean Prod* 309:127060
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319. <https://doi.org/10.2307/249008>
- Doss, C. R. (2006). Analyzing technology adoption using microstudies: limitations, challenges, and opportunities for improvement. *Agricultural Economics*, 34(3), 207–219. <https://doi.org/10.1111/j.1574-0864.2006.00119.x>
- Edimar.Caetano. (2023, August 24). *Intensive system in poultry: learn about the advantages and best practices*. Robustec. <https://www.robustec.ind.br/en/blog/intensive-system-in-poultry-learn-about-the-advantages-and-best-practices/>
- Elelu N., Z. Jaji, A. Badiru, F. Olowoleni and A.G. Ambali. 2012. Assessment of management and health practices in some selected poultry establishments in Ilorin, Kwara State, Nigeria. *International Journal of Poultry Science*. 11(8):524-528.
- Foguesatto CR, Borges JAR, Machado JAD (2020) A review and some reflections on farmers' adoption of sustainable agricultural practices worldwide. *Sci Total Environ* 729:138831
- Food and Agricultural Organization (2020). Food and Nutrition. *FAO Fifth World Food Survey*, 11(2), 53-63. Food and Agricultural Organization.
- Food and Agriculture Organization FAO, (2017). Youth and agriculture: key challenges and concrete publication in collaboration with Technical Center for Agriculture and Rural Cooperation and the International Fund for Agricultural Development. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 17(3): 427-434.
- Gittins, P. McElwee, G. Tipi, N. (2020), Discrete event simulation in livestock management, *Journal of Rural Studies*, 78:2, pp.387-398
- Gržinić, G., Piotrowicz-Cieślak, A., Klimkowicz-Pawlas, A., Górny, R. L., Ławniczek-Wałczyk, A., Piechowicz, L., Olkowska, E., Potrykus, M., Tankiewicz, M., Krupka, M., Siebielec, G., & Wolska, L. (2022). Intensive poultry farming: A review of the impact on the environment and human health. *The Science of the Total Environment*, 858, 160014. <https://doi.org/10.1016/j.scitotenv.2022.160014>
- Hafez, H. M. & Attia, Y. A. (2020). Challenges to the Poultry Industry: Current Perspectives and Strategic Future After the COVID-19 Outbreak. *Frontiers in Veterinary Science*, 7, 1-16.
- Ifabiyi, J.O. Banjoko, I.K and Shuaib, O.M (2023), Fish farmers' attitudes toward the use of social media in Kwara State, Nigeria, *International Journal of Agricultural Sciences* 5(4):59-68

- Ijatuyi, E.J (2016), Analysis of information sources used by fish farmers in Ife-central local government area of Osun-State, Nigeria, *Journal of Human Ecology* 56(1, 2):91-98
- Ishola, B.F., & Olukotun, O. (2023). Adoption of Improved Management Technologies among Poultry Farmers in Igabi Local Government Area, Kaduna State, Nigeria. *International Journal of Research in Science and Innovations*, 6(7), 176-181
- Koledoye, G.F (2024) Family Labour Utilization among Small Scale Arable Crop Farmers: Evidence from Akoko South West Local Government Area of Ondo State, Nigeria, *Eurasian Journal of Agricultural Research* 2024; Vol: 8, Issue: 1, pp: 96-106
- Leeuwis, C., & Aarts, M. N. C. (2010). *Rethinking communication in innovation processes: creating space for change in complex systems*. 1-13. Paper presented at 9th European IFSA Symposium, Vienna, Austria. [https://ifsa.boku.ac.at/cms/fileadmin/Proceeding2010/2010\\_WS1.1\\_Cees.pdf](https://ifsa.boku.ac.at/cms/fileadmin/Proceeding2010/2010_WS1.1_Cees.pdf)
- Looney, L., Montgomery, P., Edwards, M. C., Arnall, B., & Raun, W. R. (2022). Producers' adoption behaviors for precision agriculture (PA) technologies to improve nitrogen use efficiency: Diffusion of Innovations theory as an explanatory lens. *Advancements in Agricultural Development*, 3(3), 40–50. <https://doi.org/10.37433/aad.v3i3.205>
- Madane, S.B, Patil, Y.D. Nainwad, S Kabadage, A.A and Kumbhar M.S. (2019), Automatic Feeder for Poultry Farm, *Journal of Electronic and Communication System*, volume 4, issue 2, pp.19-25
- Mahanty, S., Doron, A., & Hamilton, R. (2023). Apolicy and research agenda for Asia's poultry industry. *Asia & the Pacific Policy Studies*, 10(1–3), 63–72. <https://doi.org/10.1002/app5.377>
- Mawussi Kossivi Soviadan, Osama Ahmed, Zaneta Kubik, Anselm Anibueze Enete, Chukwuemeka Uzoma Okoye & Thomas Glauben (2024) Evaluating the impact of improved technology adoption in traditional poultry farming on potential outcomes of farmers: evidence from rural Togo, *Cogent Food & Agriculture*, 10:1, 2341091, DOI: 10.1080/23311932.2024.2341091 <https://doi.org/10.1080/23311932.2024.2341091>
- Menghistu HT, Abraha AZ, Mawcha GT, Tesfay G, Mersha TT & Redda YT, 2021. Greenhouse gas emission and mitigation potential from livestock production in the drylands of Northern Ethiopia. *Carbon Management* 12(3): 289–306. <https://doi.org/10.1080/17583004.2021.1921620>
- Noack, F and Larsen, A.E. (2019), The contrasting effects of farm size on farm incomes and food production, *Environmental Research Letters*

- Nure, A.S. Shariful, I. Sarker, M.S. Begum, R. Samad, M.A. (2022), Knowledge, Attitude and Practices of Poultry Farmers on Antimicrobial Use, Resistance and Farm Hygiene Management in Bangladesh, *Research Square*, 7(4), 798-898
- Nwigbo, S. U., Mbam, B. N., Biam, C. (2016). Determinants of agripreneurship among the rural households of Ishielu Local Government Area of Ebonyi State. *Journal of Biology, Agriculture and Healthcare*, 6(13): 3-10.
- Obazi, S.A, Dimelu, M.U, Chukwueze, M. (2022) Access and Usefulness of Agricultural Information among Poultry Farmers, *International Journal of Agricultural Science, Research and Technology in Extension and Education Systems*, 12(2):65-74,
- Ogbuka, I. C. Anoliefo, E, and Ajibo, A. and Ogbuka, C. (2021) Design and Implementation of an Automated Feeding System for Poultry Farms, *Proceedings of the 4th European International Conference on Industrial Engineering and Operations Management Rome, Italy, August 2-5, 2021*
- Okike, I. O. I., Samireddypalle, A. S. A., Kaptoge, L. K. L., Fauquet, C. F. C., Atehnkeng, J. a. J., Bandyopadhyay, R. B. R., Kulakow, P. K. P., Duncan, A. D. A., Alabi, T. a. T., & Blummel, M. B. M. (2015). Technical innovations for small-scale producers and households to process wet cassava peels into high quality animal feed ingredients and aflasafe™ substrate. *Food Chain*, 5(1), 71–90. <https://doi.org/10.3362/2046-1887.2015.005>
- Okoedo-Okojie D.U., and H.O. Orhiakhi. 2012. Perceived Communication Role of Agricultural Development Programme (ADP) Among Poultry Farmers in Southern Agricultural Zone of Edo State, Nigeria. *American-Eurasian Journal of Agricultural & Environmental Sciences*, 12 (1): 57-62.
- Olanrewaju, K.O, Akintunde, O.K, Popoola, M.A., Busari, A.O. and Omotosho , M.O (2023), Towards the digitalization of poultry industry in Nigeria: An investigation of farmers' knowledge and practices, *African Journal of Science, Technology, Innovation and Development*,
- Onuekwusi, G. C, Nmeregini, D. C., and Amanze, R. (2019). Attitude of rural youths towards agripreneurship in Isiala Ngwa South Local Government Area, Abia State, Nigeria. *Proceedings of the 24th Annual Conference of the Agricultural Extension Society of Nigeria, 7th -10th April, 2019, Raw Material Research and Development Council, Abuja Nigeria.*
- Onuekwusi, G. C, Nmeregini, D. C., and Amanze, R. Elezue, C.S (2020) Factors Influencing Involvement of Youth in Poultry Production in Abia State, Nigeria. *Journal of Agricultural Extension*, Vol. 24 (4) October, 2020.
- Ovharhe, O., Emaziye, P., Alakpa, S., & Alli, F. (2021). Impact of extension training programmes on poultry farmers in Nigeria: Private farm experience. *International Journal of Agricultural Extension*, 9(2), 171-181. doi:<https://doi.org/10.33687/ijae.009.02.3268>

- Oyeniya, F., Dada, O., Popoola, I., Olowoyo, E., Oyeniya, T., Fadairo, O., & Popoola, L. (2024). A review of intensive contract poultry farming in Nigeria. *Proceedings of the Nigerian Academy of Science*, 17(1s), 141–159. <https://doi.org/10.57046/ubod4576>
- Oyeyinka, R.A. Raheem, W.K . Ayanda, I.F. and Abiona, B.G (2021) Poultry farmers’ awareness and knowledge of improved production practices in Afijio, local government area, Oyo state, Nigeria, *Journal of Agricultural Research and Development* Vol. 1(1). pp. 001-008
- Özentürk, U, Chen, Z, Jamone, L. Versace, E (2024) Robotics for poultry farming: Challenges and opportunities, *Computers and Electronics in Agriculture*, Volume 226, November
- Patel, R.K., Chander M., Verma M.R. & Johnson, D.C. (2022). Adoption of Improved Poultry Technologies amongst Members of Poultry Producer Company and Non-member Women Farmers of Madhya Pradesh, state of India. *Ind J Vet Sci and Biotech*. 18(4), 55-58
- Plaza, P. (2020, August 18). POULTRY HEALTH MANAGEMENT. *poultryplaza.com*. <https://poultryplaza.com/blog/post/poultry-health-management>
- Grinphield. (2021, February 12). <https://grinphield.com/2021/02/1bn/2/poultry-management-systems/>
- Rizzo, G., Migliore, G., Schifani, G. *et al.* Key factors influencing farmers’ adoption of sustainable innovations: a systematic literature review and research agenda. *Org. Agr.* 14, 57–84 (2024). <https://doi.org/10.1007/s13165-023-00440-7> .
- Rogers, E. M., Singhal, A., & Quinlan, M. M. (2019). Diffusion of Innovations 1. In *Routledge eBooks* (pp. 415–434). <https://doi.org/10.4324/9780203710753-35>
- Samuel. (2024b, June 7). *Top 10 poultry farms in Nigeria - Africa Farming*. Africa Farming. <https://africafarming.info/top-10-poultry-farms-in-nigeria/>
- Soviadan, M. K., Enete, A. A., Okoye, C. U., & Kubik, Z. (2023). Determinants of farmers’ participation in the agricultural sector support project for the adoption of improved technology in traditional poultry farming: Evidence from rural Togo. *Journal of Agriculture and Environment for International Development (JAEID)*, 116(2), 87–108. <https://doi.org/10.36253/jaeid-12642>
- Soviadan, M. K., Kubik, Z., Enete, A. A., & Okoye, C. U. (2022). Assessing the adoption rates of improved technology in traditional poultry farming: Evidence from rural Togo. *African Journal of Agricultural and Resource Economics*, 17(3), 206–223. [https://doi.org/10.53936/afjare.2022.17\(3\).14](https://doi.org/10.53936/afjare.2022.17(3).14)
- Suleiman M.S, Tafida I, Nazifi B. Inuwa S.I., (2023), socio-economic analysis of gender participation in poultry production in kano metropolis, Nigeria, *Journal of Agriculture and Agricultural Technology*, Vol. 9 No. 3, Pp. 70-78

- Taleb, H.M. et al (2025), Using Artificial Intelligence to Improve Poultry Productivity – A Review, *Ann. Animal Science*, Vol. 25, No. 1, pp.23–33
- The Farming Insider. (2024, January 26). *The role of technology in poultry farming*. <https://thefarminginsider.com/role-of-technology-in-poultry-farming/>
- Veterinaria Digital S.A. (2024, February 1). *Poultry production systems and facilities in laying hens*. Veterinaria Digital. <https://www.veterinariadigital.com/en/articulos/poultry-production-systems-and-facilities-in-laying-hens/>
- Wikipedia contributors. (2024, August 21). *Edo state*. Wikipedia. [https://en.wikipedia.org/wiki/Edo\\_State](https://en.wikipedia.org/wiki/Edo_State)
- Writing, D. T. P. E. A. (2023, January 2). *Full Project – PROFITABILITY ANALYSIS OF LAYER ENTERPRISE IN ESAN NORTH EAST AND OVIA NORTH EAST LOCAL GOVERNMENT AREAS OF EDO STATE, NIGERIA*. AZ Research Consult (MBA MSc Dissertation/Thesis Project Writer) Nigeria. <https://azresearchconsult.com.ng/full-project-profitability-analysis-of-layer-enterprise-in-esan-north-east-and-ovia-north-east-local-government-areas-of-edo-state-nigeria/>
- Zhou, C., & Zhong, Z. (2021, March 31). *Perceived constraints to adoption of improved poultry technology among poultry farmers in Owerri agricultural zone of Imo State, Nigeria*. Iris Publishers. <https://irispublishers.com/wjass/fulltext/perceived-constraints-to-adoption-of-improved-poultry-technology-among-poultry.ID.000644.php>
- Zhou, D. and Lele, L (2022) Farming experience, personal characteristics, and entrepreneurial decisions of urban residents: Empirical evidence from China, *Front Psychology*, Volume 13

**RESEARCH QUESTIONNAIRE**

**DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES, FACULTY OF AGRICULTURE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA**

Dear Sir/Madam,

I am a final year student of the Department and Institution named above. This questionnaire is strictly intended for academic purpose and it is designed to carry out a study on: **“Adoption of improved technology to poultry farmers in Ovia North-East LGA, Edo State, Nigeria”**. Please, fill the questionnaire appropriately and give accurate information required. There is no right or wrong answer to the question, what matters is your honest response. All information is required strictly for research purpose and is treated confidentially.

Thank you,

**JOHNSON-OKIEMUTE Miracle (Mr.)**

**INSTRUCTION: Please tick (√) in the boxes below and write where applicable.**

**SECTION A (Objectives 1): SOCIO-ECONOMIC CHARACTERISTICS OF THE POULTRY FARMERS:**

Please, kindly Tick (√) where appropriate

**1. Age:**

What is your age? \_\_\_\_\_ years

**2. Sex:**

Male  Female

**3. Marital Status:**  Single  Married  Divorced  Widowed

**4. Educational Background:**  No formal education  Primary school  Secondary school  OND/HND  NCE  B.Sc.  M.Sc.  Ph.D.

**5. Family Size:**

How many people live under the same roof in your household? \_\_\_\_\_

**6. Farming Experience:**

How many years of experience do you have in poultry farming? \_\_\_\_\_ years

**7. Farm Size:**

Number of birds: \_\_\_\_\_

Total farm capacity (square feet or acres): \_\_\_\_\_

**8. Income per Season:**

What is your total income per poultry production season? \_\_\_\_\_ Naira (#)

9. **Source of Labour:**  Family labour  Hired labour  Mechanized labour

10. **Type of Poultry Farming:**  Layers  Broilers  Mixed farming  
 Other: \_\_\_\_\_ (please specify)

**SECTION B: POULTRY FARMING TECHNOLOGIES AVAILABLE:**

Please indicate whether the following technologies are available on your farm:

TECHNOLOGY	AVAILABLE	NOT AVAILABLE
Automatic feeders		
Water systems		
Incubators		
Disease control systems		
Health monitoring tools		
LED lighting system		
Egg collection and grading machine		
Poultry vaccination systems		
Biosecurity system		
Automated manure management		

**SECTION C: AWARENESS OF POULTRY FARMING TECHNOLOGIES:**

Are you aware of the following poultry farming technologies? :

TECHNOLOGY	YES	NO
Automatic feeders		
Water systems		
Incubators		
Disease control systems		
Health monitoring tools		
LED lighting system		
Egg collection and grading machine		
Poultry vaccination systems		
Biosecurity system		
Automated manure management		

**SECTION D: SOURCES OF INFORMATION ON POULTRY FARMING TECHNOLOGIES:**

How do you get information on poultry farming technologies? (Check all that apply)

S/N	SOURCES	YES	NO

1	Radio		
2	Internet		
3	Mobile Phone		
4	Television		
5	Neighbours		
6	Friends		
7	Relatives		
8	Extension Agents		

**SECTION E: LEVEL OF ADOPTION OF POULTRY FARMING TECHNOLOGIES:**

How often do you use the following technologies on your farm?

<b>TECHNOLOGY</b>	<b>Never used</b>	<b>Rarely used</b>	<b>Sometimes used</b>	<b>Regularly used</b>
Automatic feeders				
Water systems				
Incubators				
Disease control systems				
Health monitoring tools				
LED lighting system				
Egg collection and grading machine				
Poultry vaccination systems				
Biosecurity system				
Automated manure management				

**SECTION F: PERCEIVED BENEFITS OF USING POULTRY FARMING TECHNOLOGIES:**

To what extent do you agree with the following statements about the benefits of using technologies?

<b>BENEFITS</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly agree</b>
Increased productivity					
Cost reduction					
Time savings					
Disease prevention					
Reduced mortality rate					
Improved animal welfare					
Increased profitability					
Environmental sustainability					
Enhanced food safety					

Improved bird health					
----------------------	--	--	--	--	--

**SECTION G: FACTORS MILITATING AGAINST THE USE OF POULTRY FARMING TECHNOLOGIES:**

How serious are the following factors in preventing you from using poultry farming technologies?

<b>FACTORS</b>	<b>Not a problem</b>	<b>Not serious</b>	<b>Serious</b>	<b>Very serious</b>
Cost of technology				
Access to credit				
Technical knowledge				
Poor infrastructure				
Lack of Awareness				
Disease outbreak				
High energy costs				
Limited government support				
Inadequate maintenance and repair services				
Market fluctuations				