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ASSESSING THE STRATEGIC WAYS OF DEVELOPING FISH FARMING AND ITS ECONOMIC VALUE IN AKWA IBOM STATE

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ABSTRACT

This study assessed the strategic ways of developing fish farming and its economic value in Akwa Ibom State. In carrying out the study, descriptive survey design was adopted. The study was carried out in Akwa Ibom State. The targeted population for the study comprised of all fish farmers in Akwa Ibom State. A simple random sampling technique was used to select a total of 120 fish farmers, which formed the sample size for this study. The instrument used for data collection was a structured questionnaire titled "Developing Fish Farming and Its Economic Value in Akwa Ibom State Questionnaire (DFFEVAISQ)". Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.88, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical technique such descriptive statistics to answer research questions. The study showed that the highest percentage (30.83%) of the value of Fish Farming was recorded for "Employment Creation". It also showed that the highest percentage (27.50%) of the strategic ways of developing fish farming was recorded for "Government Policy and Institutional Support". On this basis the study concluded that strengthening the fish farming sector would enhance national income, reduce pressure on wild fisheries, and provide sustainable livelihoods to rural and urban communities. It also recommended that the government should provide subsidies for fish feed, fingerlings, and essential aquaculture materials to encourage large-scale fish farming and reduce production costs.

KEYWORDS: Fish Farming, Economic Value and Akwa Ibom State

INTRODUCTION

Fish farming plays a pivotal role in modern agriculture as a sustainable method for meeting global fish demand. With the increasing depletion of natural water bodies and rising population growth, aquaculture has become an essential sector to ensure continuous fish supply. According to the Food and Agriculture Organization (FAO, 2023), aquaculture contributes over 50% of global fish consumption, demonstrating its importance in global food systems and nutrition. As wild fish stocks continue to decline, fish farming stands as a strategic approach to bridge the protein supply gap. In many developing countries including Nigeria, fish farming provides a reliable source of animal protein and income for rural households. The sector creates employment across its value chain—such as hatchery operations, feed production, pond construction, harvesting, and marketing. Adewumi and Olaleye (2022) reported that small-scale aquaculture significantly contributes to rural income and youth empowerment, making it a viable

tool for poverty reduction and community development. Thus, strengthening fish farming capacity is crucial for national economic growth.

Technological innovation is a major driver of fish farming development. Modern systems such as recirculatory aquaculture systems (RAS), cage culture, and concrete tank culture improve efficiency and maximize yield. According to Rahman & Ibrahim (2021), adoption of modern aquaculture technologies enhances water quality control, reduces mortality rates, and improves fish production outputs. However, technology adoption remains low among farmers in developing economies due to high costs and limited technical knowledge. Access to quality inputs such as high-grade fingerlings, nutritious feed and veterinary services is another essential factor in aquaculture success. Poor feed quality and unstandardized hatchery operations hinder large-scale productivity. Efficient markets ensure stable prices, reduce post-harvest losses, and expand farmers' income. Oladimeji & Eze (2023) note that improved cold-storage facilities, cooperative marketing systems, and value-added fish processing (such as smoking and packaging) enhance profitability and export potential. Therefore, strategic development of aquaculture infrastructure and market systems is essential for maximizing its economic value.

Statement of Problem

The problem of this study revolves around the underdevelopment of fish farming in Akwa Ibom State, despite its potential to significantly contribute to the local economy. There is limited knowledge on the strategic approaches necessary for enhancing fish farming practices, leading to inefficiencies and low productivity.

Research Objective

1. To find out the economic value of Fish Farming
2. To determine the strategic ways of developing fish farming

Research Question

1. What is the economic value of Fish Farming
2. What is the strategic ways of developing fish farming

Concept of Fish Farming

Aquaculture, another name for fish farming, is the scientific raising of fish in controlled environments for both commercial and personal use. In order to maximize output while maintaining sustainability, it entails managing breeding, feeding, and harvesting. Due to the global reduction in wild fish stocks and the rising demand for premium protein, the practice has expanded quickly. Fish farming is crucial for attaining food security and economic diversification in both developed and developing countries, and it makes a substantial contribution to the world's seafood supply (Araujo, Silva, Cotas, & Pereira, 2022).

Careful consideration of species selection, feeding effectiveness, water quality, and disease management is necessary for successful fish farming. Because of their versatility and quick development rates, farmers usually prefer species like carp, tilapia, and catfish. Achieving high survival rates requires maintaining ideal water parameters, such as pH, temperature, and oxygen concentration.

By implementing sustainable practices like integrated multi-trophic aquaculture and responsible feed sourcing, as well as by being aware of the different systems, species, and practices involved, individuals can contribute to the creation of a more sustainable aquaculture production, lessen the ecological footprint of fish farming, and support local economies. Fish farming

encompasses a variety of activities, such as producing fish seeds, building ponds, raising fish, processing fish, and selling fish and accessories (Udoh, Ekanem, and Offiong, 2019).

Types of Fish Farming

The regulated production of fish and other aquatic organisms like shellfish and seaweeds is referred to as fish farming, or aquaculture. It is one of the fastest-growing food production sectors in the world, giving millions of people a reliable source of protein and a means of subsistence. Fish farming promotes global food security while easing the strain on wild fish stocks through the use of contemporary technology and management techniques. Depending on the species, environment, and resources at hand, several systems are employed. The main forms of fish farming that are widely used worldwide are listed below.

- **Pond Culture**

One of the earliest and most popular aquaculture techniques is pond culture. Fish like tilapia, carp, and catfish are kept in regulated environments in artificial or natural ponds. It makes it simple to feed fish and keep an eye on their health. In rural areas, this approach is popular and economical for producing food and revenue. According to the FAO (2018), proper pond management ensures higher productivity and water quality maintenance.

- **Cage Culture**

Raising fish in net pens or floating cages in open bodies of water, such as lakes, rivers, or coastal regions, is known as cage culture. The natural water flow effectively eliminates waste and supplies oxygen. It is frequently applied to animals, including tilapia, salmon, and trout. However, ineffective management can result in disease outbreaks and environmental contamination. Beveridge (2024) noted that cage aquaculture allows efficient space utilization but requires strict monitoring for sustainability.

- **Raceway (Flow-through) Systems**

Fish are raised in long, narrow channels with constant water flow in raceway systems. For species like trout and salmon, this steady flow provides oxygen and eliminates waste. The approach is quite effective and appropriate for business use. It necessitates appropriate waste management and a consistent supply of clean water. As described by Timmons and Ebeling (2013), raceways promote healthy fish growth with effective management.

- **Recirculating Aquaculture Systems (RAS)**

RAS is a contemporary fish farming method that continuously filters, treats, and repurposes water. This closed system is perfect for indoor or urban aquaculture since it provides exact control over temperature, oxygen, and water quality. It reduces pollutants in the environment and promotes high fish numbers. Despite the high setup costs, there is outstanding operational efficiency. Martins (2010) highlighted that RAS offers a sustainable solution for future fish production.

- **Mariculture**

The farming of aquatic animals in coastal or oceanic settings, such as salmon, sea bass, and tuna, is known as mariculture. It makes use of cages, nets, or ponds that exchange nutrients and oxygen through the natural flow of seawater. High-value seafood can be produced on a wide scale using this technology. However, to avoid pollution and habitat harm, it needs to be monitored. According to FAO (2020), mariculture plays a vital role in global seafood supply and economic development.

Economic value of Fish Farming

The following are the economic value of fish farming:

- **Source of Income and Poverty Reduction**

Fish farming provides a steady source of income for farmers and other stakeholders within its value chain. The sale of live fish, fingerlings, and processed fish generates consistent revenue, helping individuals and families to meet their financial needs. Eyo and Okonkwo (2020) explained that aquaculture has become one of the fastest-growing sources of income in rural communities, offering farmers the chance to diversify their income sources and reduce dependence on seasonal crops. This contributes significantly to the eradication of poverty in many developing regions.

- **Contribution to Food Security and Nutrition**

Fish farming ensures the continuous availability of fish, which is a major source of animal protein and essential nutrients like omega-3 fatty acids, vitamins, and minerals. By providing affordable and high-quality fish products, aquaculture helps to combat malnutrition and hunger. Adebayo and Anyanwu (2023) noted that fish farming enhances food security by bridging the gap between fish demand and supply, particularly in countries with declining capture fisheries. This nutritional benefit also contributes to better public health and workforce productivity.

- **Development of Related Industries**

The growth of fish farming stimulates the expansion of other related industries such as fish feed production, processing, cold storage, packaging, and transportation. These allied industries benefit from the increasing demand for aquaculture inputs and outputs. According to Ibrahim and Umar (2021), the aquaculture sector supports several micro, small, and medium-scale enterprises (MSMEs), creating a ripple effect across the economy. This industrial linkage contributes to rural industrialization and encourages innovation in agricultural production.

Strategic ways of Developing Fish Farming

The following are the strategies ways for developing fish farming and its economic value:

- **Government Policy and Institutional Support**

Government policy and institutional frameworks form the foundation for the sustainable development of fish farming. A well-defined policy encourages private investment, regulates resource use, and protects the aquatic environment. Through favorable policies, governments can provide subsidies, tax reliefs, and low-interest loans to small and medium-scale fish farmers. Establishing specialized aquaculture agencies and research centers ensures effective monitoring and technological advancement. Furthermore, when governments integrate fish farming into national agricultural plans, it helps improve infrastructure such as roads, electricity, and water supply around fish-producing areas. According to Adewumi and Olaleye (2020), effective policy

implementation enhances aquaculture production, ensures food security, and boosts rural employment.

- **Technological Advancement and Innovation**

The introduction of modern technology is one of the most effective strategies for improving fish farming efficiency. Innovations such as Recirculating Aquaculture Systems (RAS), automatic feeders, and advanced water quality monitoring tools help maintain a balanced aquatic environment and increase fish survival rates. Technological development also includes improved breeding practices, better disease control measures, and the use of high-quality feeds.. Ezeh and Okeke (2021) observed that technological improvement has a direct link with increased fish yield, income generation, and employment opportunities for youths and women.

- **Capacity Building and Research Development**

Human capacity development and research innovation are essential for sustainable aquaculture growth. Many farmers lack the technical know-how to manage fish ponds effectively or to identify and treat fish diseases promptly. Organizing workshops, training sessions, and extension programs helps build the knowledge base of farmers. Research institutions should also focus on developing fast-growing and disease-resistant fish species, as well as cost-effective feeds from locally available materials. Afolabi and Eniola (2020) highlighted that integrating research findings with farmer training improves production techniques and reduces dependency on imported technologies. Therefore, knowledge transfer through continuous education remains a key strategy for improving productivity and profitability in the fish farming sector.

Other Impacts of Fish Farming

Fish farming, sometimes referred to as aquaculture, is the process of raising aquatic animals in regulated settings, including fish, crustaceans, and mollusks. In terms of employment, economic growth, and food security, it has emerged as one of the industries with the quickest rates of growth in the world.

Economic Development: Through the development of jobs, revenue, and foreign exchange profits, fish farming makes a significant economic contribution. Approximately 20 million people worldwide, especially in developing nations, had direct jobs in aquaculture, according to FAO (2023). In rural areas, it also provides a means of subsistence, which lowers unemployment and poverty (World Bank, 2021).

Food Security and Nutrition: Aquaculture is essential to solving the world's protein shortage. The abundance of vital elements found in farmed fish, such as vitamins, minerals, and omega-3 fatty acids, enhances human health (Tidwell & Allan, 2021). Aquaculture helps close the gap between supply and demand, improving food security as the demand for fish rises globally (FAO, 2022).

How to Produce Improvised Fish Feeds

Fish feeding is the process of supplying feeding material to fish in the pond (Udoh, Offiong and Iwatt, 2022). In order to provide a nutrient-dense diet that satisfies fish nutritional needs, locally accessible and reasonably priced resources are used in the manufacturing of improvised fish feed. For small-scale farmers who cannot afford pricey commercial feeds, this procedure is crucial. The steps that follow provide a detailed explanation of how to make homemade fish feed:

- **Identification and Selection of Feed Ingredients**

Finding and choosing appropriate local products that are high in proteins, carbs, fats, vitamins, and minerals is the first step in creating homemade fish feed. According to Gabriel et al. (2018), locally available ingredients such as soybean meal, maize bran, groundnut cake, fishmeal, cassava flour, and bone meal can be used to substitute imported materials. Cost-effectiveness, availability, and nutritional quality must all be taken into consideration while selecting these ingredients. Achieving a balanced diet that supports fish development and reproduction is the primary objective.

- **Processing of Feed Ingredients**

After selecting the ingredients, they must be processed to improve their digestibility and safety. Ochang, Fagbenro, and Adebayo (2015) explain that processing involves drying, grinding, roasting, or fermenting to remove anti-nutritional factors and enhance nutrient absorption. For instance, cassava peels must be fermented to lower the cyanide concentration, and soybean seeds must be roasted to deactivate dangerous enzymes. This stage guarantees that every ingredient is safe and appropriate for eating fish.

- **Feed Formulation and Mixing**

The process of figuring out the proper ratio of each component to satisfy the nutritional requirements of the fish species is known as feed formulation. Tacon and Metian (2017) emphasized that the formulation should provide adequate protein (30–40%), lipids (10–15%), carbohydrates (25–30%), vitamins, and minerals. To ensure homogeneity, the ingredients are thoroughly blended using a mechanical or hand mixer after the formulation has been decided. Fish development irregularities and nutrient deficiencies can be avoided with proper mixing.

- **Pelletizing and Drying the Feed**

Following mixing, the feed is pelletised to create homogeneous, compact feed particles that fish may easily eat. Falaye and Omoike (2016) noted that pelletizing improves feed stability in water and reduces wastage. The mixture is either hand moulded with basic tools or sent through a pelleting machine. The pellets are then oven-dried or sun-dried to eliminate moisture and stop the growth of mould. Additionally, drying guarantees that the feed stays fresh for a longer amount of time and increases its shelf life.

The Challenges of Fish Farming in Nigeria

Aquaculture, another name for fish farming, is essential to Nigeria's economic growth, employment, and food security. However, the industry faces a number of significant obstacles that restrict its expansion and productivity despite its increasing potential. The main obstacles to fish farming in Nigeria are described in detail below:

- **Inadequate Funding and Capital**

Limited access to financing and credit facilities is one of the main issues Nigerian fish farmers face. Many small-scale fish farmers lack the funds to purchase high-quality feed, fingerlings, and contemporary equipment. According to Adewumi and Olaleye (2019), the high cost of establishing and maintaining fish ponds discourages new entrants and prevents existing farmers from expanding. Farmers find it challenging to obtain loans since most banks view aquaculture as dangerous and need substantial collateral. Poor output, low yields, and decreased profitability are the outcomes of this capital shortage.

- **High Cost and Poor Quality of Fish Feed**

Another significant problem is the high cost and low quality of fish feed available in the market. Eyo (2017) noted that feed constitutes about 60–70% of the total cost of fish production in Nigeria. While local feeds are frequently poorly designed and result in delayed fish growth and high mortality rates, imported feeds are costly. Many farmers attempt to create homemade feeds, but the nutritional value is frequently insufficient because of their lack of expertise in feed formulation. Fish health, growth rate, and market value are all directly impacted by this problem.

- **Poor Infrastructure and Unstable Power Supply**

Reliable infrastructure is necessary for fish farming, including steady electricity, water supplies, and well-maintained transportation networks. Ayanda and Ajani (2020) observed that inadequate infrastructure and frequent power outages disrupt water pumping, aeration systems, and feed storage. Post-harvest losses result from farmers' inability to transport fish and feed due to poor roads. Furthermore, the cost of operating generators raises production costs, which lowers small-scale farmers' profit margins.

- **Fish Diseases and Poor Biosecurity**

Fish diseases and poor biosecurity management are also serious challenges. Omitoyin (2016) reported that bacterial, fungal, and parasitic infections such as Aeromonashydrophila and Ichthyophthiriusmultifiliis cause massive fish deaths in Nigerian ponds. Many farmers are unaware of cost-effective veterinarian care or preventative measures. In addition, dirty water supplies, overstocking, and inadequate pond hygiene exacerbate disease outbreaks and cause large financial losses.

- **Market and Distribution Challenges**

Fish growers frequently face price volatility and disorganised market structures despite rising demand. According to FAO (2021), middlemen control the distribution of fish in Nigeria and frequently purchase them at extremely low prices, leaving farmers with little profit. Post-harvest spoiling is also caused by the lack of conventional processing and storage facilities, particularly in rural areas. Farmers are deterred from increasing their production levels by this.

- **Government Policy and Regulatory Constraints**

Finally, the growth of aquaculture is hampered by inconsistent government policies and lax implementation of regulations. Nwosu and Ugwumba (2019) observed that while several policies exist to promote fish farming, implementation remains poor. The sector's potential for expansion is diminished by a lack of monitoring, inadequate data management, and little investment in R&D. Furthermore, farmers are unable to obtain government grants and subsidies due to bureaucratic delays and corruption.

Mitigating strategies to the challenges of fish farming in Nigeria

Nigerian fish farming confronts a number of difficulties, but they can be lessened by a mix of improved management techniques, private investment, government assistance, and technical training. The main mitigation techniques for each of the issues noted are listed below:

- **Inadequate Funding and Capital**

The government and financial organisations should offer fish farmers easily accessible credit facilities and low-interest soft loans in order to address the issue of restricted capital. According to Adewumi and Olaleye (2019), establishing agricultural microfinance banks and cooperative societies can help small-scale farmers pool resources together to finance their projects. In addition, public–private partnerships (PPP) can be developed to attract investors into aquaculture, while farmers should be trained in financial management and record-keeping to ensure efficient use of funds.

- **High Cost and Poor Quality of Fish Feed**

Farmers should be encouraged to make their own local feeds utilising easily accessible components such as groundnut cake, soybean meal, and maize bran in order to reduce the problem of feed quality and cost. Tacon and Metian (2017) suggested that improving research on local feed formulation and setting up feed quality control laboratories will ensure that feeds meet nutritional standards. Additionally, government organisations can support feed cooperatives and subsidise feed production inputs, which would enable farmers to purchase ingredients in bulk at lower costs.

- **Poor Infrastructure and Unstable Power Supply**

Government and corporate partners should make investments in irrigation systems, good road networks, and rural electrification to address infrastructure issues. Ayanda and Ajani (2020)

noted that renewable energy sources, such as solar-powered aeration systems and pumps, can reduce dependence on unstable national power grids. Fish, feeds, and inputs will be easier to transfer to and from markets if transportation networks are improved. Additionally, producers can share resources like energy, water, and storage facilities by promoting cluster fish farming in designated zones.

- **Fish Diseases and Poor Biosecurity**

Implementing biosecurity measures, such as pond disinfection, stocking density control, and the use of clean water sources, can improve fish health management. According to Omitoyin (2016), fish farmers should also receive training on disease identification and treatment using environmentally safe methods. The creation of mobile aquatic health units and veterinary labs will guarantee prompt outbreak detection and containment. Disease risks can be further decreased by implementing integrated fish health management measures and routinely monitoring water conditions.

Government Policy and Regulatory Constraints

Effective implementation and monitoring methods are necessary for improving government policies and regulations. Nwosu and Ugwumba (2019) advocate for consistent and transparent policies that support aquaculture development. Government funding for research and development should be increased, fish farmers should receive tax breaks, and fisheries rules should be reviewed and enforced. Data gathering, investment promotion, and policy implementation can all be coordinated by creating an Aquaculture Development Agency. Involving farmers in the creation of policies can help guarantee that their actual demands are taken into account.

METHODOLOGY

To carry out the study, descriptive survey design was adopted. The study was carried out in Akwa Ibom State. The targeted population for the study comprised of all fish farmers in Akwa Ibom State. A simple random sampling technique was used to select a total of 120 fish farmers, which formed the sample size for this study. The instrument used for data collection was a structured questionnaire titled "Developing Fish Farming and Its Economic Value in Akwa Ibom State Questionnaire (DFFEVAISQ)". Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.88, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical technique such descriptive statistics to answer research questions.

RESULTS AND DISCUSSIONS

Research Questions 1: The research question sought to examine the value of Fish Farming in Akwa Ibom State. To answer the research question descriptive statistics was performed on the data, (see table 1).

TABLE 1:

Descriptive statistics of the value of Fish Farming in Akwa Ibom State

Value	Frequency	Percentage
Employment Creation	37	30.83**
Source of Income and Poverty Reduction	29	24.17
Contribution to Food Security and Nutrition	25	20.83
Development of Related Industries	17	14.17
Foreign Exchange Earnings	12	10.00*
TOTAL	**120**	**100%**

** **The highest percentage frequency**
* **The least percentage frequency**
SOURCE: Field survey

Research Questions 2: The research question sought to determine the strategic ways of developing fish farming in Akwa Ibom State. To answer the research question descriptive statistics was performed on the data, (see table 2).

TABLE 2:

Descriptive statistics of the strategic ways of developing fish farming of Akwa Ibom State

Strategies	Frequency	Percentage
Government Policy and Institutional Support 27.50**	33	
Access to Finance and Credit Facilities	27	22.50
Technological Advancement and Innovation	24	20.00
Capacity Building and Research Development	22	18.33
Market Development and Value Addition	14	11.67*
TOTAL	**120**	**100%**

** **The highest percentage frequency**
* **The least percentage frequency**
SOURCE: Field survey

The above Table 2 presents the descriptive statistics of the startegic ways of developing fish farming in Akwa Ibom State. From the result of the data analysis, it was observed that the highest percentage (27.50%) was recorded for "Government Policy and Institutional Support", while the least percentage (11.67%) was recorded for Market Development and Value Addition.

This finding agrees with the opinion of Adewumi and Olaleye (2020), who stated that effective policy implementation enhances aquaculture production, ensures food security, and boosts rural employment. Furthermore, when governments integrate fish farming into national agricultural plans, it helps improve infrastructure such as roads, electricity, and water supply around fish-producing areas.

CONCLUSION

In conclusion, fish farming is a highly valuable agricultural sector with the potential to enhance food security, generate employment, and stimulate national economic growth. Sustainable development of the aquaculture industry relies on improved technology adoption, quality inputs, farmer capacity building, government policy support, and effective market structures. Strengthening these strategic areas will significantly increase productivity, encourage youth participation, and boost export trade, ultimately contributing to long-term economic sustainability and poverty reduction.

RECOMMENDATIONS

1. The government should provide subsidies for fish feed, fingerlings, and essential aquaculture materials to encourage large-scale fish farming and reduce production costs.
2. Financial institutions and agricultural development banks should offer low-interest loans, grants, and flexible repayment plans to fish farmers to expand production and adopt modern technologies.
3. Investment in cold-storage facilities, transportation networks, cooperative marketing 321systems, and value-added processing (such as drying, smoking, and packaging) should be prioritized to reduce post-harvest losses and increase market value.

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