


# Journal of Agricultural Economics, Extension and Science

Vol. 7 No 4
December, 2021
Print ISSN: 2545-5179
Online ISSN: 2714-5018

College of Agricultural Economics and Extension
Joseph Sarwuan Tarka University, Makurdi, Benue State, Nigeria

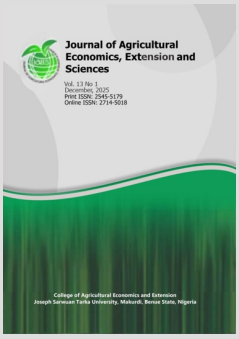
Journal of Agricultural Economics, Extension and Science - JAEES

Print ISSN: 2545-5176
Online ISSN: 2714-5018



Print ISSN: 2545-5176
Online ISSN: 2714-5018






# Editorial Board

**Proud Members of JAEES Editorial Board:**

**Prof. A.I. Age**
**(Editor-in-Chief)**
Lecturer, Federal University of Agriculture, Makurdi.

**Assoc. Prof. (Mrs). D.P. Ani**
**(Associate Editor)**
Lecturer, Federal University of Agriculture, Makurdi.

**Prof. E.A. Unongo**
**(Auditor)**
Lecturer, Federal University of Agriculture, Makurdi.

**Prof. (Mrs). J.A.C. Ezihe**
**(Marketing Editor)**
Lecturer, Federal University of Agriculture, Makurdi.

**Prof. I. Anonguku**
**(Marketing Editor)**
Lecturer, Federal University of Agriculture, Makurdi.

**Prof. (Mrs). G.C. Aye**
**(Treasurer)**
Lecturer, Federal University of Agriculture, Makurdi.

**Assoc. Prof. P.G. Kughur**
**(General Secretary)**
Lecturer, Federal University of Agriculture, Makurdi.

**Dr. S.T. Demenongu**
**(Financial Secretary)**
Lecturer, Federal University of Agriculture, Makurdi.

**Dr. A. Soom**
**(Production Editor)**
Lecturer, Federal University of Agriculture, Makurdi.

**Dr. A.I. Ochalibe**
**(Editorial Assistant)**
Lecturer, Federal University of Agriculture, Makurdi.

**Dr. (Mrs). E.N. Mbah**
**(Editorial Assistant)**
Lecturer, Federal University of Agriculture, Makurdi.

**Dr. A. D. Teran**
**(Editorial Assistant)**
Lecturer, Federal University of Agriculture, Makurdi.

**Editorial Advisers:**

1. Prof. C.P.O. Obinne
2. Prof. O.J. Okwu
3. Prof. P.I. Ater
4. Prof. (Mrs). O. Abu
5. Prof. (Mrs). C.K. Biam
6. Prof. G.A. Abu
7. Dr. P.T. Tsue

**International Editors:**

**1. Prof. S.G. Mbogoh**
Department of Agricultural Economics, University of Nairobi, Kenya.

**2. Prof. G. Tamilselv**
Department of Agricultural Extension, University of Annamalai, India.

**3. Dr. Djomo Raul**
Department of Agricultural Economics and Agribusiness,
Faculty of Agriculture and Vetinary Medicine, University of Buea, P.O. Box 63 Buea, South West Region, Cameroon.

If you would like to be a part of our Editorial Board then please send us your resume at **editorialboard@jaees.org**



©2026 Journal of Agricultural Economics, Extension and Science (JAEES) - All Rights Reserved. Privacy Policy

JOURNAL OF AGRICULTURAL ECONOMICS, EXTENSION & SCIENCE ISSN (Print ) 2545-5179, ISSN (Online) 2714-5018
Official Journal of the College of Agricultural Economics, Extension & Science JAEES Vol. 7 No. 4 2021, Pages 51 - 70
www.jaees.org

# RISK FACTORS ASSOCIATED WITH VALUE ADDITION IN COMMERCIAL AQUACULTURE IN OSUN STATE, NIGERIA

**Samuel Awolumate[1] and Iniobong B. Inyang[2]**

[1]. Department of Animal Science and Fisheries, Faculty of Agricultural Sciences, National Open University of Nigeria, Nigeria.
Email: sawolumate@noun.ng.edu

[2]Nyles Development Analytics International, Uyo, Akwa Ibom State, Nigeria.
Email: inbainy@yahoo.com

**Abstract**
This study assessed risk factors associated with an investment in fish farming value addition in commercial catfish in Osun State, Nigeria. A multi-stage sampling technique was used in selecting 120 fish farmers. Descriptive statistics and factor analysis were deployed in analyzing the data. Risk factors severity ranking incidence index showed that more than 65% of fish farmers were affected. Lack of government support ranked highest at 0.98as a risk factor. Eleven risk factors to fish farming value addition were considered sufficiently tenable in the study area when subjected to the Kaiser-Meyer-Olkin and Barlett test of sphericity. Factor analysis identifies four major underlying constraint dimensions: high business operational cost, lack of government strategic intervention or support, inadequate capacity building opportunities, and poor-water quality with percentage variance of 24.56%,19.63%,13.13%, and 10.16%, respectively. 50% of respondents fall within the level of severity index range of (0.24-0.5099) that admitted that constraints are moderately severe. Risk factor severity index profile of fish farmers' characteristics showed that gender (0.021, 0.05) was a statistically significant variation of mean index of constraints value addition investment. The need for strategic government intervention in facilitating a low-cost operating environment for farmers is imperative.

**Keywords:** Catfish; Profitability; Variability, Investment, Fish farming, Constraints

## Introduction

Rapid advancement in aquaculture development has significantly impacted fish supply for human consumption, as cultured fish output rivals if not overtaking captured fish output (FAO, 2016). This trend reveals its prospect as a potent socio-economic tool in overturning or taming fundamental human economic challenges or necessities of individuals or as well as macro-economic upheavals such as food inadequacy (insecurity)/malnutrition, a high index of unemployment/poverty, and slow pace of economic growth (GDP), by being a reliable source of health-friendly nutritional food requirement- omega III fatty acid potent

in reducing cardiovascular diseases and facilitating good brain cell development to enhance intelligent quotient of children (Kris-Etheron *et al*. 2002); income with an extensive employment engagement capacity; accelerating economic growth by meeting domestic demands for consumption and feedstock for the industrial sector, and export for foreign exchange income earnings (Dagtekin and Emeksiz, 2007).As rapid population growth persists, it creates entrepreneurial stimulus or incentive, thus instigating interest for fish farming adoption. Persistent demand upsurge for food protein such as catfish (*Clarias gariepinus &Tilapia Zilli* ) emerges as the most preferred farmed species for this kind (sort) of agro investment, especially in Nigeria.

An investment decision based on anticipation for profit returns and sustenance is usually influenced or determined by threats/opportunities inherent in the business environment. The pursuit for opportunities amidst threats informs risk evaluative disposition or perception by fish farmers, therefore, inculcating risk attitudes, which forms a critical component in managerial decision making, querying the rationale for intended committal of financial capital or the adoption of new technology for aquiculture fisheries investment intent/operations(Ajetomobi et. al., 2006).Thus, risk evaluation (attitude) becomes an indispensable attribute or tool for either subjective or quantitative assessment for intended/on-stream investment (fish farming) profit realization or returns. Although a concept, the risk might be ambiguous; it assumes an adverse diversion from the expected outcome. Expectations may be numerous but subject to the farmer's specific aspirations or objectives, including favorable or stable price, profitability, market share dominance, and lower mortality rates of hatchlings. However, these may not be realistic since fish farming is fraught with risks. Most significantly, an aquatic-centered activity demands constant monitoring and understanding of water requirement dynamics in wetlands for the cultured species Davranche et. al., (2013). However, fish farming risk transcends the aquatic habitat being critical for fish survival/growth but is, also visible along with fisheries value chain investment (Mwangi, 2007).

The pervasive (dimension) nature or attributes of risk in fish farming, just as in any other agricultural business, indicates or portends the measurability of potential or anticipated losses that might occur or strike during farming operations or investment life span (Epetimehin, 2014). The risk factor evokes reactions in mitigating its adverse impacts

through widely used approaches; low-cost production, disease prevention, preventing fish escapes, low debt to equity and high liquidity, improving species (animals) welfare, and reducing environmental problems (Bergfjord,2009). Similarly, Ajetombi and Binuomote, (2006) highlighted some approaches, including forwarding pricing, insurance, and diversification. It is pertinent to note that the use of insurance and diversification as tools of risk managements rarely prominent among fish farmers in Nigerian fish farming settings due to the peculiarity of their socio-economic characteristics, conspicuous with low capital base for investment or business expansion, technical inefficiency, and other daunting challenges (issues) of inadequate supply quality fish seed, less extension support services, effective management strategy, cost-effective feed, poor infrastructure, limited credit opportunities(Awoyemi et al.,,2003; Ajao et al., 2005; Fapohunda et al., 2005; Ojo et al., 2006a, Kareem et al., 2008; Ogundari and Ojo, 2009).

The prevalence of these inhibiting factors as profiled in kinds of literature impedes optimum fish culturing output and substantial investment in fish value addition operations, hence abating fish insufficiency or inadequacy. Therefore, sustaining fish import enterprise towards addressing supply deficit in the country. The plethora of these constraints are in dimensions or perspectives as *Economic*- inflation, exchange rate fluctuations/local currency devaluation, ease of accessibility/and affordability of credit; *Production*-the dearth of professional knowledge in fish production(rearing), processing, marketing, and use of new technologies; *Institutional or regulatory framework policies*-extension service coverage, research, financial intermediation (subsidies), physical infrastructure provision inadequacy; *Socio-economic*- age, household size, years of experience, income level, gender, educational level; *Environment*- water pollution, flood, drought. The severity of these factors breeds uncertainty, denoting the inability to establish an outcome-based quantitatively. Such outcomes as akin to fish farming investments may include benchmark output targets, marketing targets, profitability.

However, fish farming is profitable amidst uncertainty, and this notion ignites entrepreneurial commitment by farmers to remain in business and optimism driven by a risk-taking attitude. Risk-taking behavior is an entrepreneurial attribute or instigating factor that could facilitate business objectives/goals towards accomplishment. It unveils the subjective disposition of farmer risk perception about the fish farming enterprise.

Variability in risk-taking also portrays a behavioral perspective of constraint in inhibiting fish farming value investments.

Risk uncertainty as an integral part of any business or investment hence necessitates the use of a suitable risk management plan or approach in anticipation for its adverse impact and to embolden entrepreneurial intent, likewise serving as a strategic tool in fostering (sustaining) business (productivity/longevity) or continuity by preventing sudden or eminent business or investment mortality. With a risk mitigation plan in place, one would anticipate a substantial increase in aquaculture fisheries output and its allied investment component. Unfortunately, fish farming value investment has experienced mass entry, gradual exit, and the virtual abandonment of fish farming operations or business in sub-Saharan Africa (Nigeria) (FAO, 1996). Such trend is an insignia of risk aversion attitude among fish farmers or fish entrepreneurs, implicitly contributing to under performance of cultured fish output or production despite the country' secological diversity advantage in cultured fish farming.

There exist extensive studies literature addressing this abnormally towards solving the production constraints and minimizing technical inefficiency or raising technical efficiency in achieving optimum fish output for national self-sufficiency. Nevertheless, it appears less or inadequate attention is given to behavioral dimension (risk aversion) constraints to fish farming value investment, which deepens the void in attaining the desired advancement towards sustainable development in the aquaculture fisheries sub-sector of the economy. Therefore, filling this gap necessitates the focus on the risk factors dimension as the primary objective of the study. In their diverse forms and sources. Analysis of risk factors induce risk aversion or attitude towards fish farming investment constraints, variability incidence index relative ranking, major dimensions, levels of severity, and profile analysis would form the specific objectives, of which the result will show how it influences farmers' preferences for fish farming value investment.

**Methodology**

The study was carried out in Osun State, in the Southwestern geopolitical zone of Nigeria. It lies between longitude 4 and 5° E and latitude 7 and 8 °N. The State has a population of 4,705,589 (National Population Commission, 2016)located within the tropics and enjoys two distinct climatic seasons. The wet season commences from April to October, and the dry season operates between November and March. Osun State was selected because of the

predominance of emerging fish farming enterprises resulting from the State government's promotion of fish farming to combat the twin problem of unemployment and poverty. Osun state is also one of the states with the largest number of active fish farmers. The study population consisted of all active farmers in four Osun State Agricultural Development Programme (OSADEP)in Osun State.Primary data were collected from fish farmers. A multi-stage sampling technique was used to select respondents. At the first stage, a proportionate sampling method was used to select 120 respondents from the lists of fish farmers obtained from the zonal office of the Osun State Agricultural Development Programme (OSADEP) in Osun State as follows: Osogbo, Ife, Ijesha, and Iwo. Secondly, 30 fish farmers were randomly selected in each ADP zones. In all, a sample of 120 fish farmers was selected for this study. Primary data were collected with the aid of a well-structured questionnaire. Data collected were analyzed using descriptive statistics and inferential statistics. Descriptive statistical tools such as mean, incidence index, frequency distribution, and percentages were used while factor analysis was used to ascertain underlying dimensions of the investment in commercial aquaculture in the study areas.

**Result and discussion**

**Response variability, incidence index, and relative ranking of the risk factors in fish value investment in fish farming in the study area.**

Table shows the distribution pattern of respondents in value-added investment. It measures the severity of risk factors variability to fish farming value investment, which gives or paints the picture of risk perception argued as an indicator of risk aversion behavior. The index component shows the census of conditions that inform the relative ranking order of positioning risk factors in the study area. It represented the proportion of those affected adversely by the risk factors and showed the capturing of the spread of the components of risk factor variation intensity across the population. Relative ranked constraint positions 1$^{st}$ to 7$^{th}$ created constraints that affected more than 65% of fish farmers. 1$^{ist}$ and second risk factors affected virtually all the fish farmers, with 3$^{rd}$ to fourth-ranked risk factors adversely affecting virtually more than 80% of the population distribution. Virtually more than 60% of the study population experienced an adverse business condition that threatens their wealth creation effort.

As highlighted in Table 1,lack of government support is the most ranked risk factor with an

incidence index of 0.983,suggesting the need for strategic government intervention in fish farming value add investment. Possibly in addressing production challenges; of the high cost of feeds, high cost of fingerlings, and access to low-cost credit. The essence of government strategic or specific intervention is its enormous capacity to reposition a fragile economic sub-sector- agriculture (aquaculture) to become a virile type. Leveraging on its statutory powers (policies/regulation), subsidies, and supports given that developing economies (Nigeria) are predominantly public sector driven. Obwanga et. al (2017) affirmed that as long as aquaculture remains at a small-scale level, the availability of subsidy and credit systems (economic transfers) by the government will be limited. Rothuis et. al. (2011), also, stated that the number of active farmers decreased due to issues such as the reduction of subsidized inputs. Item 3 in Table 1, high cost of feed, is the second most ranked risk factor, with 0.967 the incidence index. It constitutes a threat to the investment profitability margin or proportion since it is an inevitable variable factor in fish culturing within a production cycle. According to Samson *et al*. (2012), 42% of the total cost of feed and feeding ingredients is within a production cycle. Aliu et. al., (2017) asserted that the cost of feeds is high in catfish production. Acheneje (2011), also identified fish feed and fingerlings as two significant components that deepen fish farmers' variable cost. The proportional increase in variable cost due to high feed cost raised the operational cost of production and retarding optimism about fish farming investment. Lack of access to training as item 2, in Table 1, is the third risk factor ranked with 0.883 as its incidence index, insinuating the challenge of inadequate coverage of extension services coverage prevalence which implies a low spread of new knowledge acquisition and technology in fish farming. Thus, creating an advertency for a possible high rate of less-experienced or inexperienced fish farmers, perhaps accounting for the high level of risk aversion among less-experienced farmers (Oluwatayo *et al.,* 2017). Item 7, lack of skilled staff; is ranked fourth with 0.833 as an index risk factor; this informs the need for skilled personnel assistance in fish farming to facilitate business adaptation response to business environment shocks through the utilization of business management tools to remain competitive (Bene *et al.,* 2015). Thus, it necessitates managerial competency to achieve a better business performance amidst risk(uncertainty).

Item 1, lack of access to credit, ranked fifth with 0.783 index as a risk factor, and it depicts one of the perennial challenges in agricultural investment. Measures like credit schemes

programs by the government towards solving this challenge, and credit access difficulty persist and constitute a setback to agricultural productivity or investment. Dhruba (2018), however, noted that prolonged credit access contributes to a low proportion (21.4%) of risk preferring farmers in the earthen pond system against 52% in the concrete system (Oladimeji et al., (2019).Security risk factor ranked sixth having an incidence index of (0.717) as shown in item 9 in table 1. This emerging risk factor places the lives of farmers and their fish facility at risk, thus straining the investment optimism intent and also revealing the ineffective synergy between the community security watch initiative and the conventional security system tamed the spike in insecurity towards reducing theft and protecting lives and property. Item 10, the inadequate storage facility, is ranked seventh with (0.683) as incidence index. It shows the hitherto challenge faced by farmers in fish value addition component in aquaculture in the form of post-harvest losses/ short shelf life of the commodity before reaching the final consumer. It is fueling the probability of failure in achieving income (profit) predetermined targets or inducing risk-averse, attitudinal prevalence among farmers. Low water quality is item 4, in table 1, which ranked eighth with (0.533), itdepicts the spillover effect of lack of access to training which would have bridged the gap in the technical know-how in detecting and managing water requirements for the cultured species Sidoruk et. al., (2018). Also, the vagaries of climatic conditions or extremes, drought/flooding further facilitates low water quality for fish culture. Flooding, item 8 in table 1, is ranked ninth with (0.517) incidence index is an absolute risk, in which its source is impersonal and with a massive adverse impact. It is a threat to fish value-added farming investment, most especially in the earthen pond system. It contributes to low water quality, disease, fish mortality, and fish escape. Chukwu (2014) reported that Seventy-six percent of the respondents stated that flooding distorted the fishing business, destroyed fishing implements, and impacted negatively their social life among Fishermen's families.

Item 5, in table 1, is high transportation cost ranked tenth with (0.400) placed as one but last ranked risk factor implies or suggest the likelihood of fish farmers to retain such or tame its effects or impact on the investment profit performance by factoring the cost to reflect on the final sales price of the commodity, but this could affect sales turn due to increase in price. This was corroborated by James et. al., (2011) that the cost of transportation is on the rising particularly in peri-urban locations.Item 11, disease and pest infestation is being the last ranked risk factor with (0.217), suggest that farmers may have adopted a means of

contending with this constraint to their fish value addition investment either by quick sales (price forwarding) or the adoption of technology, although it remains a challenge to fish value addition investment. This agreed with the finding of Nwakuche, et. al., (2019). They affirmed that disease and pest infestation (43.33%) was a serious problemamong fish farmers in Kwara State.

**Table 1: Response Variability, Incidence Index, and Relative Ranking of the Risk Factors to Fish Farming Value Addition Investment in the Study Area**

| Item | Constraints | Not Serious | Moderately Serious | Serious | Very Serious | AII and RROP |
|---|---|---|---|---|---|---|
| 1 | Lack of government support | 1.7 | 3.3 | 35 | 60 | 0.983 1st |
| 2 | The high cost of feed | 3.3 | 60 | 31.7 | 5 | 0.967 2nd |
| 3 | Lack of access to training | 11.7 | 55 | 33.3 | 0 | 0.883 3rd |
| 4 | Lack of skilled staff | 11.7 | 55 | 26.7 | 6.7 | 0.833 3rd |
| 5 | Lack of access to credit | 21.7 | 35 | 21.7 | 21.7 | 0.783 5th |
| 6 | Security | 28.3 | 53.3 | 13.3 | 5 | 0.717 6th |
| 7 | Poor storage facility | 31.7 | 45 | 13.3 | 10 | 0.683 7th |
| 8 | Poor water quality | 46.7 | 48.3 | 5 | 0 | 0.533 8th |
| 9 | Flooding | 48.3 | 46.7 | 3.3 | 1.7 | 0.517 9th |
| 10 | High transportation cost | 60 | 31.7 | 6.7 | 1.7 | 0.400 10th |
| 11 | Disease and pest infestation | 78.3 | 18.3 | 1.7 | 1.7 | 0.217 11th |

**Major Dimensions of the Risk Factorsto Fish Value Addition in Commercial Fish Farming**

Several constraints factors induce risk perceptions/attitudes towards fish farming, which could adversely affect the output. Although there is a dominance of qualitative identification of constraints analysis in fisheries literature, a quantitative approach to the generation of evidence for decision-making under uncertainty becomes extremely necessary. Quantitatively some of these constraints could be aligned towards a standard action that can address several factorsto achieve a succinct change or result for the desired intervention. Then it is pertinent to adopt a statistical procedure that can reproduce a set of interrelated factors without losing its original set of characteristics. Hence factor analysis is suitable for this sort of statistical operation, being a data tool that can generate sets of actionable factors that can serve multifunctional purposes. Therefore, factor analysis is a data reduction procedure that can achieve the aim of a generation of factors that can serve a multifunctional purpose to predict and measure the significant or significant dimensions of constraints affecting fish farming and value-added investment enterprise in the study area.To optimize fish farming investment, the understanding of the significant dimensions of constraints for policy planning and the decision requires empirical procedures that can compress the most prominent constraint into significant dimensions to check the level or extent of constraint affecting fish farming/value addition investment entrepreneurial entrant behavior.

Table 2 analyzed the underlying dimension of constraint items. These items were subjected to factor analysis using the principal component approach to reduce the number of items into a significant and sizeable significant number of dimensions using the Eigenvalue criterion of greater than or equal to 1, to select the underlying dimension of 11 initial items. The KMO and Barlett test of the factor analysis result revealed that the 11 constraints in fish farming/value addition investment identified, were significantly and adequately tenable to measure respondents in the study area. Four mutually exclusive and significant patterns were given by factor analysis of the 11 constraints in fish farming value-added investment. These four significant patterns were;Constraints risk factor (factor 1): High business operational cost with the variance of 24.564% and loaded high with these constraints or risk factor items; high cost of feed (0.604), flooding (0.816), disease and pest (0.882) implying that high operational production cost captured as the high cost of feedin the study contracts profit margin in fish farming value-added investment.

This was in line with Edet et al. (2018) who reported that the high cost and unavailability of fish feed concentrate make fish farming unproductive.

Risk factor 2: Lack of government strategic intervention or support with the variance of 19.626%, loaded high with lack of access to credit (0.601), high transportation cost (0.669), lack of skilled staff (0.716), lack of government support (0.748).With the rapid pace of development in aquaculture globally impacting fish supply increased output for consumption, Nigeria is yet to attain such height. This agrees with the finding of Akanbiet al. (2018) who reported that there was a significant relationship between fish output and government intervention strategies.Therefore,through policies or programs (subsidy), strategic government intervention would facilitate aquaculture growth/development in addressing basic human economic necessities and accelerating economic growth. Risk factor 3: inadequate capacity building or training opportunities with a variance of 13.134% and loaded high with inadequate storage facility (0.522), security (0.591), lack of access to training (0.819). Aquaculture is a profitable business venture but fraught with risk which emanates from socio-economic, environmental production, cultural and psychological sources Nmadu *et al*., (2012). With access to training, the trend of gradual exit and the virtual abandonment of fish farming investment would be addressed or reverted. Risk factor 4: Poor water quality with variance 10.160% and loaded high with low water quality (0.923) thus depict aquaculture as a technically sensitive business venture which frequently requires expertise in understanding water requirement situations or dynamics suitable for the intended cultured fish or species Sidoruk et. al., (2018). Thus, highlightingthe imperativeness of water management technical knowledge.

**Table 2: Dimensions of the Risk Factors to Fish Value Addition in fish Farming**

| **Rotated Component Matrix** | | | | | |
|---|---|---|---|---|---|
| | Component | | | | |
| | 1 | 2 | 3 | 4 | CEI |
| The highcostoffeed | .604 | | | | .741 |
| Diseaseandpestinfestation | .882 | | | | .786 |
| Flooding | .816 | | | | .738 |
| Lackofaccesstocredit | | .601 | | | .387 |
| Hightransportationcost | | -.669 | | | .603 |
| Lackofgovernmentsupport | | .748 | | | .668 |
| Lackofskilledstaff | | .716 | | | .623 |
| Lackofaccesstotraining | | | -.819 | | .724 |
| Security | | | .591 | | .679 |
| Poorstoragefacility | | | .522 | | .570 |
| Poorwaterquality | | | | .923 | .903 |
| **Diagnostic Statistics** | | | | | |
| Initial Eigenvalues | 2.702 | 2.159 | 1.445 | 1.118 | |
| % of Variance | 24.564 | 19.626 | 13.134 | 10.160 | |
| Cumulative % | 24.564 | 44.190 | 57.324 | 67.484 | |
| Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. | | | | | |
| a. Rotation converged in 6 iterations. | | | | | |

| **KMO and Bartlett's Test** | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .527 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 184.943 |
| | Df | 55 |
| | Sig. | .000 |

**The Level of Severity of the constraintto Fish Farming Value Addition Investment in Commercial Aquaculture**

The incidences of constraints variability the identification of significant constraints (risk factors) dimensions in the study area, and the covariate magnitude of constraints severity across the population are expedient to evaluate the scale of its impact in the study area.Table 3 shows the categorization of the severity of constraints in fish farming value-added investment, which could induce risk aversion, and affect investment performancewhen considering the diverse distribution patternof constraints in fish farming value investment in commercial aquaculture. The distribution pattern captures;severity index range, categorization of the constraints, severity index into range based on not serious, moderately severe, severe, also frequency and percentages.

The result indicates the affirmation by farmers that there are challenges that hinders fish

farming value investment. However, farmers or respondents within the index range of 0.00-0.2599 admitted that the constraints are not severe. 50.00% of the respondent within the severity constraint index of 0.24-0.5099 being majority, affirmed that constraints are moderately severe. 48.40% within the index range of 0.51-0.7599 admitted that constraint is very severe, and 2.60% of farmers within 0.75 – 1.00 index range agreed that constraints are severe, implying that a significant level of constraint severity is witnessed or experienced in fish farming value investment in the study area, which could impede output efficiency/profitability hence impacting on risk attitude preferencesor variations of farmers.

**Table 3: The Level of Severity of the constraint to Fish Farming Value Addition Investment in Commercial Aquaculture**

| | | Fish Farmer | |
|---|---|---|---|
| 0.00-0.2599 | Not Serious | 0 | 0.00 |
| 0.24-0.5099 | Moderately Serious | 60 | 50.00 |
| 0.51-0.7599 | Serious | 58 | 48.40 |
| 0.75-1.00 | Very Serious | 2 | 2.60 |
| Total | | 120 | |

**Profile Analysis of Constraint to Value-Added Investment in Commercial Catfish Aquaculture (CVAICCA) index**

The socio-economic profile analysis of fish farmers/ fish farming value-added investment constraints severity would give insight into the design of technical advisory services that would enhance sustainable growth/development and address risk-aversion attitude towards fish farming investments/its allied business components. Table 4 depicts farmers/firms' socio-economic characteristics based on the following attributes; age, household size, years of experience, gender, marital status, level of education, access to the credit facility, and being a member of the association.

Item 1 of Table 4, age; showed a direct proportional distribution patternwith CVAICCAmean index of the first two and last two age ranges (less than 30years/31-40years) and (41-50years/50 years and above), where age increases along with a mean index of both sub-groups.The age range of less than 30years where the majority(40.00%) followed by (28.33%)

of 31-40years, 41-50years age range and 50years above were (21.67%) and (10.00%) respectively. Both the majority age range and its closest age range comprises of farmers within the active labor age, with physical/mentalvigor advantage as asset considering the rigors of fish farming value addition, characterized with old technology prevalence (dependency) also confronted with competition (fish import) and other challenges. It portends high productivity or output, signaling an optimistic risk-taking behavior since increasing risk aversion is associated with older farmers (Amaefula *etal.,* 2012; Oluwatayo *et al.,* 2017; Oladimeji *et al.,* 2019). Although CVAICCA means index was virtually the same, age was not statistically significant as a risk factor. Nevertheless, it is a determinant to risk aversion levels, and it increases risk neutrality among farmers in the earthen pond system Oladimeje *et al.,* (2019). Nielsen et al. (2013) found that old farmers are more risk-averse than young farmers; whereas Maart-Noelck and Musshoff (2013) found no such significant effect of age on risk attitudes.With more proportion of younger farmers, involvement in fish farming value-added investment,riskaversion(behavioral) constraints would be minimized hence encouraging more output.

Item 2, household–size, is a strategic resource in fisheries division of labor either in the capture or cultured fisheries operations,as older household members' labor effort or engagement is of immerse value (Inyang; Udong 2013). The distribution of household size based on the result shows that it influenced the severity of the CVAICCA index across the two categories of household size,irrespective of the mean index variation, the extent of the CVAICCA where virtually the same as a household with 1-5 person experience less impact of CVAICCA and that it was statistically not significant. The majority, 85.00%, were of the household size of less or equal to five persons as 15.00% comprises of the household size of 6-10 person. The preference for a small household size of less or equal to 5 agrees with family planning campaign awareness on reproductive preferences, considering the economic realities impacton welfare. It couldinfluence sales or profit performance since a large household size is at risk of increased home consumption of fish, thus enhancing the advertency for risk aversionbecause satisfying home needs than business purposes might be of immediate importance and ifthere are difficultiesinexpanding the scope or size of investmentexist. Its impact on risk attitudereduces the risk-seeking level of farmers in concrete pond systems, according to Oladimeji *et al*. 2019.

The result of item 3, Table 4, shows that farmers with less than ten years of experience were majority (90.00%), while those of 11-20years and 31-40years made up 6.67% and 3.33%, respectively. This distribution reflects the mass entry and virtual exit or abandonment trend in the fish farming enterprise in sub-Saharan Africa (FAO, 1996), which gives an insight into the severity of risk factors inherent in the business environment, perhaps depicting the smaller percentage of farmers in business beyond 10years. Furthermore, the CVAICCA mean index between the groups was virtually the same but is not statistically significant. Nevertheless, long years of experience intuitively is expected to aid business longevity and subsequently impact risk attitude given the accumulative years of experience in the fish farming business. An older farmer has a better understanding of production technology and its associated challenges and would be proffering solutions when they arises, thus awakening business enthusiasm (Amaefula, 2012; Nmada *et al*., 2012).Oluwatayo *et al*. (2017) opined that less-experienced farmers exhibited a high-risk aversion than older farmers. Based on the assertions mentioned earlier, it is pertinent that farmers with longer years in fish farming value would tend to be less risk-averse since leveraging on various risk mitigation plans might have produced a more desirable result.

Item 4 depicts a distribution pattern contrary to women's perception constituting the more significant percentage of labor personnel in agricultural activity (Tanko, 1999). 88.34% of farmers in the study are males as against 11.66% being females, implying that intuitively men are the prime breadwinners as they engage more in fish farming enterprise and probably aid the supply of fish for value-added investment. However, statistically, the sex of managers or entrepreneurs was significant to CVAICCA mean indexdespite indicating a very closed variability index. The females showed less CVAICCA than the male, giving an insight that the sex of managers or farmers was significant determinate to risk aversion or attitude.Item 5 reveals family heads' involvement in fish farming value enterprise, indicating that 68.33% are married, which portrays the statutory responsibility to earn income in meeting a family financial obligation. It is an indicator of high societal esteem for marriage, culminating in support enjoyed by spouses while undertaking the business venture. Nevertheless, marital status did not affect CVAICCA mean index. Although, the married category constituting 68.33% of the distribution recorded a higher index than the never group and statistically was not significant to constraint, implying that marital status does not influence risk attitude in fish farming value investment.

Item 6 in Table 4, the highest level of education is not statistically significant to CVAICCA, with variation in the mean index to CVAICCA and each level of education,primarily recorded high followed bytertiary education than secondary school levelas primary education had. The distribution showed that respondents with tertiary education exposure were 61.66%, secondary school 31.67%, and primary school was 6.67%. They suggested that a higher level of education places one in a vantage position for a better information-seeking attitude. This creates enlightenment and deepens technical know-how or enhances a critical analytical disposition in evaluating risk threats to businesses to avoid invoking mitigation strategies in anticipation of risk occurrence. This implies that educational level influences risk attitude or aversion, and aid either aid the reduction in risk aversion. As buttress by Oladimeji *et al*. (2019) result or findings that education reduces risk neutrality in both concrete/earthen pond systems.

In item 7, in Table 4, 78.33% have access to credit, and 21.67% have no credit access. This distribution pattern suggests the co-existence of formal and informal credit market systems such as developing economies, each complementing the other. The informal credit system serves as an alternative for farmers with less stringent credit guidelines against the formal credit system, perhaps aiding credit access. Hoff and Stiglitz, 1990; Kochar, 1997; Bell *et al*., 1997; Mohield in and Wright, 2000). In terms of mean index, accessibility to credit did not reduce the CVAICCA mean index. However, access to credit determines risk aversion; Oluwatayo *et al.,* (2017) slated that capital has a positive impact on risk aversion, as farmers with substantial capital may tend to be risk-averse and invest elsewhere think it is less risky or stable than a fish farming value investment. Oladimeji *et al*. (2019) attributed a low proportion of risk-seeking in the earthen pond system to a lack of credit access. Item 8 shows that membership of association did not influence the CVAICCA index as both groups have virtually the same CVAICCA index, the yes group majority 75% while no group was 25%. Association membership intends to create social supports for building networks in marketing and sharing experiences related to fish farming value investment. Suggesting that it could reduce risk aversion as the social network could impact marketing to facilitate sales. On the contrary result of Oladimeji et al. (2019) assert that cooperative society increased risk neutrality, with the reason that those set of farmers may not have been active in cooperative membership.

**Table 4:** Risk Factor Severity Index Profile of Fish Farmers' **Socio-Economic** Characteristic

| Item | Category | frequency | Means | Value (sign =0-05) |
|---|---|---|---|---|
| **1** | **Age (years)** | | | |
| | Less or equal 30 | 48 | 0.5028 [a] | 0.977 [NS] |
| | 31-40 | 34 | 0.5348 [a] | |
| | 41-50 | 26 | 0.5017 [a] | |
| | Above 50 | 12 | 0.5417 [a] | |
| **2** | **Household size** | | | |
| | Less or equal 5 | 102 | 0.5058 [a] | 6.150 [NS] |
| | 6-10 | 18 | 0.5707 [b] | |
| **3** | **Years of experience** | | | |
| | less than 10 | 108 | 0.5156 [a] | 0.092 [NS] |
| | 11-20 | 8 | 0.5057 [a] | |
| | 31-40 | 4 | 0.5341 [a] | |
| **4** | **Gender** | | | |
| | Male | 106 | 0.5150 [a] | 0.021 [S] |
| | Female | 14 | 0.5195 [a] | |
| **5** | **Marital status** | | | |
| | Never married | 38 | 0.5036 [a] | 0.692 [NS] |
| | Married | 82 | 0.5211 [a] | |
| **6** | **Highest level of education** | | | |
| | Primary | 8 | 0.5398 [a] | 1.790 [NS] |
| | Secondary | 38 | 0.4892 [a] | |
| | Tertiary | 74 | 0.5264 [a] | |
| **7** | **Access to the credit facility** | | | |
| | Yes | 94 | 0.5218 [a] | 1.489 [NS] |
| | No | 26 | 0.4930 [a] | |
| **8** | **Member of Association** | | | |
| | Yes | 90 | 0.5187 [a] | 0.311 [NS] |
| | No | 30 | 0.5061 [a] | |

## Conclusion

Aquaculture has emerged as a potent option for accelerating economic growth/development,but its potency is on a substantial level of investment. Intuitively, profit realization or maximization drives investment intent but is implicitly determined (influenced) by risk factors severity. The study reveals the risk factors severity ranking of farmers. Seven ranked risk factors out of 11 affected more than 65% of farmers;4 major risk factors dimensions that affect fish farming investment identified; the categorizing of risk factors severity level based on index ranges- with 50% admitting it to be moderately severe and the socio-economic profile indices dimension (perspective) of risk factors two being

statistically significant.

However, risk factors severity creates or induces a behavioral constraint dimension to(regarding) aquaculture value-added investment uptake, thus resulting in farmers' exhibition of risk aversion tendencies either being more risk-averse, neutral, or seeking with a consequential impact on cultured fish output and in its allied investment component. Addressing risk factor severity of fish farming value-added investment is critical in minimizing the behavioral constraint or risk factor, which requires strategic government intervention in facilitating a low-cost operating environment for farmers through the use of statutory powers, for subsidies/ regulation, creating more technical capacity training opportunities for farmers.

**References**

Acheneje, S. andOkwu, O J (2011). Socio-economic analysis of fish farming in Makurdi Local Government Area, Benue State, Nigeria. *European Journal of Social Sciences*, Vol 23 No 4: 508-519

Ajao, A.O., Amao, J.O. and Williams, S.B. (2005). Determinants of Technical Inefficiency of Fish Farms in Oyo State, Nigeria, *Journal of Sustainable Development,* 2 (2), pp.33-9.

Ajetomobi, J. O and Binuomote, S.O. (2006). Risk Aversion among Poultry Egg Producers in Southwestern Nigeria. *International Journal of Poultry Science* 5 (6): 562-565.

Ajetomobi, J.O., and Binuomote, S.O. (2006). Risk Aversion among Poultry Egg Producers in Southwestern Nigeria, *International Journal of Poultry Science,* 5 (6), pp.562-565.

Akanbi, S.O and Muhammed-Lawal, A. (2016). Cultured Fish Farmers' Perception of Government Intervention and Constraints in Cultured Fish Production in Kwara State, Nigeria NSUK *Journal of Science & Technology*, Vol. 6: No. 2. pp. 91 -94

Aliu, B. S., Afolabi,J. O., Egwenomhe,M. and Esume A. C. (2017). Survey on Nutrition and Feeding Practices of Fish by Farmers in Ondo State, Nigeria. Asian Journal of Biology. 2(1): 1-9,

Amaefula, C., Okezie, C.A., Mejeha, R. (2012). Risk Attitude and Insurance: A Causal Analysis, *American Journal of Economics*, 2 (3), pp. 26-32.

Awoyemi, T.T., Amao, J.O. and Ehirim, N.C. (2003). Technical Efficiency in Aquaculture in Oyo State Nigeria, *Indian Journal of Agricultural Economics,* 8(4), pp.812-19.

Bell, C., Srinivasan, T.N., Udry, C., (1997). "Rationing, Spillover, and Interlinking in Credit Markets: the Case of Rural Punjab. "Oxford Economic Papers. Oxford University Press. 4 (49):557–585.

Bene, C., Barange, M., Subasingle, R., Pinstrup-Anderson, P., Merino., G., Hemre, G., and E. Williams. (2015). Feeding 9 billion by 2050 – Putting fish back on the menu. Food Security: The Science, Sociology, and Economics of Food Production and Access to Food. Springer(online)DOI 10.1007/s12571-015-0427-z. 7(1): 16pp.

Bergfjord, O. J. (2009)'Risk perception and risk management in Norwegian aquaculture,' Journal of Risk Research, 12:1,91-104. DOI: 10.1080/13669870802488941; http://dx.doi.org/10.1080/13669870802488941

Chukwu, M, N (2014). Impact of Flooding on Fishermen's families in Pedro Community, Iwaya-Lagos, Nigeria. J. Appl. Sci. Environ. Management. Vol. 18 (4) 647 – 651

Dagtekin M. Ak, O. and Emeksiz, F. (2007). Socio-economic analysis and marketing patterns of the fish fanning industry in Trabzon, Turkey assessed online from www.fao.org/docrep/012/iI373e92.pdf.

Davranche, A.; Poulin, B.; Lefebvre, G. Mapping flooding regimes in Camargue wetlands using seasonal multispectral data.Remote Sens. Environ. 2013,138, 165–171

Dhruba, P. 2018. Managing Credit Risk and Improving Access to Finance in Green energy projects. ADBI Working Paper 855. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/managing-credit-risk-improving-access-finance- green-energy-projects

Edet, E. O., Udoe, P. O., and Uwah E. D. (2018). Costs and returns analysis of fish farming in Calabar Metropolis, Cross River State. Global Journal of Agricultural Sciences VOL. 17, 2018: 23-31

Epetimehin, F. M. (2014). Risk Exposures, Vulnerability and Mitigation Methods among Road Transport Workers in Nigeria*, European Journal of Business and Management,* 6(5).incomplete

FAO (1996), "Fisheries and aquaculture in Sub-Sharan Africa: situation and outlook in 1996."

FAO (2016). The State of World Fisheries and Aquaculture 2016. Contributing to Food Security and Nutrition For All. Rome, FAO. 200 pp. http://www.fao.org/3/a-i5555e.pdf

Fapohunda, O.O., Ojo, S.O. and Balogun, A.M (2005). Analysis of Productivity of Biotechnical Factors and Technical Efficiency of Aquaculture Production in Ondo State, Nigeria, Journal of Animal and Veterinary Advances, 4 (5), pp. 535-39.

Garling, D. L. (1993). Making Plans for Commercial Aquaculture in the North Central Region. *University of Missouri Extension Manual MX391*. [Online] Accessed 20-08-2013. http://extension.missouri.edu/p/MX391.

Hoff, K., and J. Stiglitz.(1990). " Imperfect Information and Rural Credit Markets: Puzzles and Policy Perspective." World Bank Economic Review. Vol.4. No. 35:235 – 250.

Inyang, E.B. and Udong, E.E. (2013). Gender, Livelihood Security and Diversification in an Environmentally-Challenged Niger Delta Region. *The International Journal of Humanities andSocial Science. (India)* : 1(1):44 – 52. Be consistent 1(1), pp 44-52

James W. Miller & Tunde Atanda (2011) The rise of peri-urban aquaculture in Nigeria, International Journal of Agricultural Sustainability, 9:1, 274-281,

Kareem, R.O., A.O. Dipeolu, A.B. Aromolaran, and S. Akegbejo. (2008). Analysis of Technical, Allocative and Economic Efficiency of Different Pond Systems in Ogun State, Nigeria, *AfricanJournal of Agricultural Research,* 3 (4), pp. 246-54.

Kochar, A. (1997). "Does Lack of Access to Formal Credit Constraint Agricultural Production? Evidence from the Land Tenancy Market in Rural India." American Journal of Agricultural Economics, Vol. 79: 754-763 be consistent

Kris-Etherton PM, Harris WS, Appel LJ. 2002. Fish consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. Circulation 106:2747–2757.

Louise, V.R. (1977). Fish farming International Unit of Aquatic pathobiology. University of Stirling, Scotland, 4:17-19.

Maart-Noelck, S.C. Musshoff. O. (2013). Measuring the risk attitude of decision-makers: are there differences between groups of methods and persons? Aust. J. Agric. Resour. Econ., 58 (3) pp. 336-352

Mohieldin, M. S. and P. W. Wright (2000). Formal and informal credit markets in Egypt.Economic Development and Cultural Change 48(3), pp. 657–670.

Mwangi, M. H. (2007). A Comparative Economics Evaluation of Farming of three Important Aquaculture Species in Kenya, A Project submitted to the United Nations University Fisheries Training Programme, Pp. 65.

Nielsen, T., Keil, A. and Zeller, M (2013) Assessing farmers' risk preferences and their determinants in a marginal upland area of Vietnam: a comparison of multiple elicitation techniques. Agric. Econ., 44 (3) pp. 255-273

Nmadu, J. N., Eze, G.P. and Jirgl, A. J. (2012). Determinants of Risk Status of Small-Scale Farmers in Niger State, Nigeria. *British Journal of Economics, Management, and Trade,* 2 (2): 92-108.

Nwakuche, E. I., Akinyoade, O. F., Akalonu, G. C., Oyelade, O. A., and I. O. Opowoye (2019). Problems Facing Fish Farming Business in Kwara State: A Case Study of Four Local Government Area. Continental Journal for Sustainable Development. 10 (2): 27 – 34

Obwanga, B. and Lewo, M.R., (2017). *From aid to responsible trade: driving competitive aquaculture sector development in Kenya; Quick scan of robustness, reliability, and resilience of the aquaculture sector.* Wageningen, Wageningen University & Research, Report 2017-092 3R Kenya. 68 pp

Ogundari, K. and Ojo, S.O. (2009). An Examination of Income Generation Potential of Aquaculture Farms in Alleviating Household Poverty: Estimation and Policy Implication from Nigeria. *Turkish Journal of Fisheries and Aquatic Sciences,* 9 (1), pp. 39 - 45.

Ojo, S.O., Afolabi, J.A and Fagberno, O.A. (2006a). Profitability and Technical Efficiency of Artisanal Fisheries Production in Nigeria, *Journal of Sustainable Tropical Agricultural Research,* 19, pp. 23-30.

Ojo, S.O., Fagberno, O.A. and Fapohunda, O.O. (2006b). Productivity and Technical Efficiency of Aquaculture Production in Nigeria: A Stochastic Frontier Production Function Approach, *WorldAquaculture Magazine,* 37 (3), pp.18-23.

Oladimeji, Usman, Y., Galadima, Ali, S., Hassan, Abdullahi A., Sanni, Abubakar, A., Abdulrahman, Sani, Egwuma, Henry, Ojeleye, Oluwaseun, A., Yakubu A. (2019). Risk Analysis in Fish Farming Systems in Oyo and Kwara States, Nigeria: A Project Towards Improving Fish Production. Animal Research International, 16 (1): 3226-3237.

Oluwatayo, I. B. and Timothy, O. (2015). Risk attitude among catfish farmers in Oyo State, Nigeria. *Investment Management and Financial Innovations,* 12 (4).

Rothuis, A. J., van Duijn, A. P., van Rijsingen, J. C. M., van der Pijl, W., & Rurangwa, E.

(2011). Business opportunities for aquaculture in Kenya, with special reference to food security. LEI report 2011-067/IMARES report C131/11. Wageningen: Wageningen UR.

Samson, Y. A, and Adeoye, D. (2012). Measuring Profitability in Small Scale Aquaculture Enterprises in southwest Nigeria. *IIFET 2012 Tanzania Proceedings*.

Sidoruk, M. and Cymes, I. (2018). Effect of Water Management Technology Used in Trout Culture on Water Quality in Fish Ponds. Water 2018, 10, 1264

Tanko, N. M (1994). Contribution of Rural Women to Agriculture Planning and Development in Nigeria in Ikpi, A.E and J.K Olayemi (Ed) Sustainable Agriculture and Economic Development Nigeria. Sterling Publisher and Printers Ltd. Nigeria. P. 80 – 85.