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PROSPECTS AND CHALLENGES OF FISH FARMS IN BAUCHI STATE, NIGERIA

[1]UMARU, B.Y,. [1]BABUGA, U.S, AND [2]GARBA, A

[1]Department of Agricultural Technology, Federal polytechnic Bauchi, Bauchi State, Nigeria [2]Department of Agricultural Extension and Management, Binyaminu Usman Polytechnic, Hadejia, Jigawa State.

Abstract

The study identified the prospects and constraints associated with fish farms in Bauchi State, Nigeria. Socio-economic characteristics and constraints associated with the fish culture farms were examined. The fish farms were farm enterprises that produced

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Introduction

Aquaculture also known as fish farming falls under the animal production sector of agriculture. Other areas include artisanal and industrial (Ebong, 2007). The most common species of fish cultivated among fish farmers within Nigeria are catfish (*Heterobranchusspp*) and *Tilapia spp* (*Godwin*, 2012); Other species of fish which are cultivated because of the market demand, low in calories and cholesterol level include *Clariasgariepinus*, *Mugiespp, Chrysichthysnigrodigitatus*, *Heterotisniloticus, Ophiocephalus obscure, Cyprimescarpio* and *Megalospp*. The following pond systems are practiced and have potential for development in Bauchi State: i) Earthen pond; ii) Concrete tank; iii)

fingerlings and dried fish using smoking kiln. Data for the study were obtained from 7 existed fish farms in the study area. Data were analysed using descriptive statistics such as frequency and percentage and Likert's scale.The study revealed that fish farms were mostly operated by the males' folks with the age range of 41-50 years that were married with the household size of 6-10 persons. The fish farms had farmers who were experienced, educated, and were into full time farming. Nevertheless, the fish farms suffered the constraints of high cost of investment, irregular supply of electricity, poor floating and poor drying of fish by the smoking kiln amongst others. It was therefore recommended that the operators of fish farms be provided with loan assistance, current technical knowledge and adequate training to enable them overcome the constraints.

Plastic trough; iv) Re-circulatory water system; v) Tarpaulin trough and vi) Flow through systems (Renand, 2011).

The need for aquaculture arose from the decrease in supply from ocean fisheries as a result of over fishing, habitat destruction and pollutions (Adedeji and Okocha, 2011). The fish farmers cannot supply the required quantity of mature fish due to the constraints associated with fingerling and feed production and processing (Ozigbo *et al*, 2014). According to Ogugua and Eyo (2007) the cost of feed alone claims over half of the total budget for most fish farms. This and other cost of aquaculture has increased the price of fish beyond the reach of most Nigerians (Bamiro *et al.,* 2001). The economic implication on the part of the producer is that any producer who can lower his cost by a few amounts per fish will gain a larger share of the market. The desired cost-saving can be achieved through vertical integration (Ouden den*, et al,* 1996).

Dependence on the use of the external market to obtain an input or to exchange an output may be achieved through the use of a contract or a spot market. But, the quality of the input and the timeliness of the supply cannot be guaranteed. The failure of the external market reduces the profit and

creates risk for the farm and thereby calls for vertical integration (Bamiro *et al.,* 2001).

Feeds and fingerlings, the major factors militating against the cost and availability of the aquaculture industry, hamper production, not only on the basis of high cost but also due to low quality supplied which has negative impact on the growth rate and productivity; hence, the need for backward vertical integration through the production of quality feeds and fingerlings by each aquaculture farm-firm (Paolucci, *et al,* 2012).Besides, fish needed to be processed as soon as they are harvested. The main aim of fish processing is to prevent fish from deteriorating. Deterioration of fish is a situation whereby fish without care gets spoil. There are various ways whereby fish can be processed to avoid spoilage. We have salting, smoking, drying, curing, dehydration, canning and cooking (Oluebubechi, 2014).

In recent times the experience of fish farmers has shown that aquaculture business has been suffering some setbacks caused by increasing cost of feeds amongst others, these reduce the net return from the business significantly (Adewuyi *et al*, 2010). Also many of the existing aquaculture farms are folding up and prospective investors are becoming increasingly reluctant to invest (Moss and Schmitz, 2000).

Given the fact that the fish farmers have little or no control over the demand and prices of the products, because of the nature of the market which is more or less perfectly competitive; a more plausible approach to increasing net return to farmers in aquaculture is to reduce the cost of production (Bamiro *et al*, 2001).

Therefore, the constraints of vertical integration needed to be identified and the way forward suggested; as the transaction costs incurred are eliminated or least reduced when a company own two or more stages of production of an aquaculture business (Dobashi *et al* 1999). The specific objectives were to:

1. describe the socio-economic characteristics of vertically integrated fish culture farms and
2. assess the constraints associated with vertically integrated fish culture farms in Rivers State, Nigeria.

Materials and method

The study was conducted in Bauchi State. It is located between latitude 9^0 3"- 12^0 3" North of the Equator and 8^0 50" - 11^0 East of the Greenwich Meridian. It has a land area of 22,852 km^2 representing 46.42% of the total land mass of the entire Bauchi state. The area has a populationof 1,715,404 representing 36.87% of the population of the entire state (NPC,2006).

The population of the study comprises all the fish farms in Bauchi State as compiled by the Fishery Unit, Bauchi State Agricultural Development Programme, (BSADP). For the purpose of this study, the farms are those farms that used internally for the production of mature fish using smoking kiln for drying. All the 7 fish farms in the State were used for the study due to the low number.

Analytical Technique

Objective one was analyzed using descriptive statistics such as frequency and percentage. Objective two was analyzed using a five point Likert's rating scale. The specification codes of the scale used are as follow: Strongly agreed = 5, agreed = 4, undecided = 3 disagree =2, strong disagreed = 1. Constraint mean values of 3.0 and above were regarded as important constraints while those below 3.0 were regarded as not important. A list of constraints based on literature review and interactions was given to the respondents (Isong, 2014).

Socio-economic characteristics of respondents

Table 1 reveals that majority of the vertically integrated respondents (81.0%) were males while (19.0%) were females. The study showed that the male folks dominated the vertically integrated fish culture business. The implication is that fish culture business requires strong and energetic individuals which men can always be ready to take up than women. This is in agreement with the report of Olawoye (2001) who noted that majority of the fish culture farmers were males in his evaluation of the aquaculture status in Oyo.

As regards the age range that were involved in the fish culture business, closed to half of the respondents fall under the age group of 41-50 years (48.7%), followed by (35.1%) in the age group of 51-60 years and 31-40 years with (16.2%) while there was no respondent within the age group of 20-30 years and above 60 years among the vertically integrated aquaculture farmers. The study revealed that the age group of 41-50 years was involved in vertically integrated fish culture business in the study area. The implication is that at the age of 41-50 years, which the modal age is; any farmer is energetic, productive and innovative and can take risk in investment. This finding is in agreement with the results of Bolorunduro (2003) who observed same among the fish culture farmers in Niger State and reported that the age-group of 41-50 years is the most active and productive years of farmers.

Table 1: Socio-economic characteristics of vertically integrated fish culture farmers

N = 37

Characteristics	No	%
Sex		
Male	30	81.0
Female	07	19.0
Age (years)		
20 – 30	0	0.0
31- 40	06	16.2
41-50	18	48.7
51-60	13	35.1
61 and above	0	0.0
Marital Status		
Single	03	8.1
Married	34	91.9
Divorce	0	0
Household Size		
1-5	16	43.2

6-10	21	56.8
11-15	0	0.0
Experience (years)		
1-5	04	10.8
6-10	0	0.0
11-15	03	8.1
16 and above	30	81.1
Level of Education	0	0.0
No formal education	0	0.0
Primary	0	0.0
Secondary	05	13.5
Tertiary	32	86.5
Contact with Extension Workers Per Month		
0 time	20	54.1
1 time	13	35.1
2 times	04	10.8
3 times	0	0.0
5 times	0	0.0
Mode of Farming		
Part time	17	45.9
Full time	20	54.1

Source: Field survey data, 2018

Concerning the marital status, majority of the vertically integrated fish culture farmers were married (91.9%), (8.1%) were single and none was divorced. The result showed that the vertically integratedfish culture farmers were married couples than single. This implies that fish culture business is mostly carried out by the married in the study area. This is in agreement with the findings of Ifejika and Ayanda (2005) who reported same about fish culture farmers in Kainji Lake Basin of Nigeria.

Regarding the household size, most of the respondents (56.8%) that vertically integrated their fish culture business have house size ranging

from 6-10 persons, followed by (43.2%) of the respondents having 1-5 persons. None of the respondents accepted that the household size of 11-15 persons was involved in vertically integrated fish culture business. The result revealed that the vertically integrated fish culture farmers had household size ranging from 6-10 persons. The implication is that the existing family size is large enough to provide the needed assistance in the farm labour supply so as to enhance increase productivity. This result is in agreement with the findings of Ibemere and Ezeano (2014) who stated that most fish culture farmers in Rivers State had household ranging from 6-10 persons.

Concerning the experience in fish culture business, majority of the fish farmers had 16 and above years of experience representing (81.1%), followed by 1-5 years of experience (10.8%), and 11-15 years experience of (8.1%). None of the respondents had 6-10 years of experience. The result showed that most of the fish culture farmers who vertically integrated had more years of experience. The implication of this finding is that most of the partially integrated and non- integrated fish culture farmers swift over to vertically integrated fish culture business when the necessary operational technicalities required for the business have been acquired. The years practiced as either a partially integrated or a non-integrated venture are counted and included in the years of experience of the vertically integrated fish culture farmers, thereby increasing the years of experience acquired. This, therefore, increases production and productivity among the fish culture farmers. Besides, these groups of farmers saw that vertically integrated fish culture business is more profitable than the partially integrated and the non-integrated fish culture businesses existing in the study area.

As regards the level of education, majority of the vertically integrated fish culture farmers undergo tertiary education (86.5%) and secondary education of (13.5%). None of the respondents had either primary or formal education. The study revealed that most of the fish culture farmers in the study area who vertically integrated were highly educated people. This is in agreement with the report of Ibemere and Ezeano (2014) who

emphasized that the fish culture farmers who vertically integrated in Rivers State were highly educated people.

For the contact with extension workers, majority of thevertically integrated fish culture farmers were not visited by extension agent (54.1%), followed by those visited once (35.1%), and those visited twice (10.8%). None of the respondents was visited three and five times. The study showed that majority of the vertically integrated fish culture farmers were not visited by extension agents in a month. This implies that the fish culture farmers who vertically integrated were exposed to seminars, conferences and professional trainings on fish culture business and do not need the services of the extension agents who were not enough in the study area. The few available extension agents decided to concentrate on the partially integrated and the non- integrated fish culture farmers who needed extension assistance because of their low level of education.

Regarding the mode of farming, majority of the vertically integrated fish culture farmers agreed that their mode of farming was full time with (54.1%) and the part time respondents attracted (45.1%). The study revealed that most of the fish culture farmers who vertically integrated operated on a full time basis. This implies that vertically integrated fish culture business is time consuming and needs devoted individuals for the profit to be reaped.

CONSTRAINTS EXPERIENCED BY THE RESPONDENTS

Table 2 shows the distribution of respondents according to the constraints faced by the fish culture farms in the study area.

Table 2: Responses to Constraints of Vertical Integration in Fish Culture Farms

S/N	Constraints	5 SA Frequency	4 A Frequency	3 UD Frequency	2 D Frequency	1 SD Frequency	Total Frequency	Total Score	Mean Score
1.	High Cost of Investment..	37 (100)	0 (0)	0 (0)	0 (0)	0 (0)	37 (100)	185	5.0

2.	Irregular Supply of Electricity	36 (97.3)	1 (2.7)	0 (0)	0 (0)	0 (0)	37 (100)	184	4.97
3	Poor Floating of the Feed Produced.	35 (94.6)	2 (5.4)	0 (0)	0 (0)	0 (0)	37 (100)	183	4.96
4.	Poor Drying by the Smoking Kiln.	34 (91.9)	3 (8.1)	0 (0)	0 (0)	0 (0)	37 (100)	182	4.92
5.	Disruptions in Supply Chain Hurts Sales.	33 (89.2)	4 (10.8)	0 (0)	0 (0)	0 (0)	37 (100)	181	4.89
6.	Delay in Capturing Values.	31 (83.8)	6 (16.2)	0 (0)	37 (0)	0 (0)	37 (100)	179	4.84
7.	Monopolization of Market.	29 (78.4)	8 (21.6)	0 (0)	0 (0)	0 (0)	37 (100)	177	4.78
8.	The Activities Involved are Stressful.	28 (75.7)	9 (24.3)	0 (0)	0 (0)	0 (0)	37 (100)	176	4.76
9.	Inventory Buildup.	24 (64.9)	13 (35.1)	0 (0)	0 (0)	0 (0)	37 (100)	172	4.65
10.	Loss of Specialization	25 (67.6)	10 (27.0)	2 (5.4)	0 (0)	0 (0)	37 (100)	171	4.62
11.	Seasonal Supply of Raw Materials for Feed Production	30 (81.1)	3 (8.1)	0 (0)	4 (10.8)	0 (0)	37 (100)	170	4.59
12.	Lack of Variety in Product.	10 (27.0)	27 (73.0)	0 (0)	0 (0.0)	0 (0)	37 (100)	158	4.27
13.	Lower Synergy.	8 (21.6)	23 (62.2)	6 (16.2)	0 (0)	0 (0)	37 (100)	150	4.05

14.	High Rate of Poaching	6 (16.2)	26 (70.3)	5 (13.5)	0 (0)	0 (0)	37 (100)	149	4.03
15.	High Cost of Coordination	7 (18.9)	22 (59.5)	8 (21.6)	0 (0)	0 (0)	37 (100)	147	3.97
16.	Incidence of Infectious Disease.	4 (10.8)	25 (67.6)	8 (21.6)	0 (0)	0 (0)	37 (100)	144	3.89
17.	Reduced Flexibility	5 (13.5)	24 (64.9)	8 (21.6)	0 (0)	0 (0)	37 (100)	133	3.59
18.	Inability to Develop Local Feed.	0 (0)	0 (0)	6 (16.2)	20 (54.1)	11 (29.7)	37 (100)	69	1.86
19.	Lack of Skilled Manpower.	0 (0)	0 (0)	0 (0)	30 (81.0)	7 (0)	37 (100)	67	1.81
20.	Inadequate Marketing and Distribution.	0 (0)	0 (0)	0 (0)	20 (54.1)	17 (45.1)	37 (100)	57	1.54
21.	Availability of Many Suppliers.	0 (0)	0 (0)	0 (0)	5 (13.5)	32 (86.5)	37 (100)	42	1.14

(Percentage results are in parenthesis)**Source: Field survey data, 2018**

A five point Likert's rating scale was used to measure the constraints. The scale was coded: Strongly Agreed (SA) =5, Agreed (A) =4, Undecided (UD) =3, Disagreed (D) =2, and Strongly Disagreed (SD) =1. Constraints with mean scores of 3.0 and above were regarded as important while those with mean scores below 3.0 were regarded as not important.

1. **High Cost of Investment**: With a mean score of 5.0 all the respondents (100%) strongly agreed that high cost of investment was an important constraint affecting vertically integrated fish culture business.

2. **Irregular Supply of Electricity:** More than 90% of all the respondents agreed that irregular supply of electricity was an important constraint faced by vertically integrated fish culture farms. It has a mean score of 4.97. This result agrees with the findings

of Ibemere and Ezeano (2014) who earlier stated that irregular electricity affected water supply in vertically integrated fish culture farms in Rivers State, Nigeria.

3. **Poor Floating of the Feed Produced:** A total of 94.60% of the respondents having a mean score of 4.96 agreed that poor floating of the feed produced was an important constraint faced by vertically integrated fish culture farms. This results in sudden pollution of the pond and if not check can stress the fish and lead to the death.

4. **Poor Drying of Fish by the Smoking Kiln:** More than 91% of the respondents agreed that poor drying by the smoking kiln was an important constraint faced by vertically integrated fish culture farmers. This brings about the bad taste of the fish. It has a mean score of 4.92.

5. **Disruption in Supply Chain Hurts Sales:** 89.2% of the respondents having a mean score of 4.89 agreed that disruptions in supply chain that hurts sales was an important constraint faced by vertically integrated fish culture farms.

6. **Delay in Capturing Values**. More than 80% of the respondents agreed that delay in capturing values was an important constraint faced by vertically integrated fish culture business. It has mean score of 4.84.

7. **Monopolization of Market:** A total of 78.4% of the respondents, having a mean score of 4.78 agreed that the monopolization of the market was an important constraint affecting vertically integrated fish culture farmers.

8. **The Activities Involved are Stressful**: More than 70% of the respondents with a mean score of 4.76 agreed that the activities involved in vertically integrated fish culture business are stressful. It was therefore considered an important constraint.

9. **Inventory Build-up:** A total of 64.9% of the respondents having a mean score of 4.65 agreed that build-up of inventory was an important constraint faced by vertically integrated fish culture business.

10. **Loss of Specialization**: More than 60% of the respondents having a mean score of 4.62 agreed that loss of specialization was an important constraint associated with the vertically integrated fish culture business.

11. **Seasonal Supply of Raw Materials for Feed Production:** A total of 81.1% of the respondents with a mean score of 4.59 agreed that seasonal supply of raw materials for feed production was an important constraint facing vertically integrated fish culture farmers

12. **Lack of Variety in Product**: 73.0% of the respondents having a mean score of 4.27 agreed that lack of variety in product was an important constraint associated with vertically integrated fish culture business.

13. **Lower Synergy**: A total of 62.2% of the respondents with a mean score of 4.05 agreed that the lowering of synergy was an important constraint faced by vertically integrated fish culture farmers.

14. **High Rate of Poaching:** More than 70% of the respondents having a mean score of 4.03 agreed that high rate of poaching was associated with vertically integrated fish culture business. It was therefore considered an important constraint.

15. **High Cost of Coordination:** A total of 59.5% of the respondents with a mean score of 3.97 agreed that high cost of coordination was an important constraint faced by vertically integrated fish culture farmers.

16. **Incidence of Infectious Disease:** More than 60% of the respondents having a mean score of 3.89 agreed that the incidence of infectious disease was associated with vertically integrated fish culture business. It was therefore considered an important constraint.

17. **Reduced Flexibility:** A total of 64.9% of the respondents with a mean score of 3.59 agreed that reduced flexibility was an important constraint associated with vertically integrated fish culture business in the study area.

18. **Inability to Develop Local Feed:** The mean score of 1.86 reveals that the respondents disagreed that inability to develop local feed was not

an important constraint associated with vertically integrated fish culture business.

19. **Lack of Skilled Manpower:** With the mean score of 1.81, it shows that majority of the respondents disagreed that lack of skilled manpower was not an important constraint faced by vertically integrated fish culture farmers.

20. **Inadequate Marketing and Distribution:** The mean score of 1.54 indicates that all the respondents disagreed that inadequate marketing and distribution was not an important constraint militating against fish culture business in the study area.

21 **Availability of Many Suppliers:** The mean score of 1.14 implies that majority of the respondents strongly disagreed that the availability of many suppliers was not an important constraint faced by vertically integrated fish culture business.

Conclusion and Recommendations

The fish farms were mostly operated by the males' folks with the age range of 41-50 years that were married with the household size of 6-10 persons. The fish culture farms had farmers who were experienced, highly educated, and were into full time farming. Nevertheless, the fish culture farms suffered the constraints of high cost of investment, irregular supply of electricity,poor floating of the feed produced and poor drying of fish by the smoking kiln amongst others. It was therefore recommended that the operators of the farms be provided with loan assistance, current technical knowledge and adequate training to enable them overcome the constraints.

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