



COOPERATIVE FINANCING AND THE GROWTH OF CATFISH AQUACULTURE VALUE CHAIN IN NIGERIA

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ABSTRACT

Cooperative-based growth model for agricultural enterprises is gradually gaining popularity in application. This study examined the effect of cooperative financial intervention on the growth of catfish aquaculture value chain in Nigeria. Primary data collected, with well-structured questionnaire from 120 participants in aquaculture value chain, were analyzed with descriptive statistical tools, cost and return function and 4-point likert-type scale. The result shows that 32.3% and 27.3% of processors and input suppliers accessed ₦320,000 and ₦270,000, respectively. Only 18.2% of producers accessed ₦180,000. The result indicates that there are more catfish producers than any other operators in the value chain. There is interdependence between catfish producers and input suppliers, processors and marketers in the value chain. Furthermore, catfish processors and inputs suppliers accessed more cooperative loan because their activities were capital intensive. The relatively high amount of cooperative fund accessed by these groups translated high growth rate of 55% and 53%, respectively. The major constraints to the growth of catfish value chain were inadequate credit access and high expenditure on inputs. Operators in the catfish aquaculture value chain should be encouraged to attend workshops on management techniques to improve the efficiency of their businesses.

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INTRODUCTION

Catfish aquaculture involves the practice of catfish farming in a confined body of water. Globally speaking, catfish aquaculture has been growing steadily in food production subsector at an annual rate of 8.9% (World Fish Center, 2010). Catfish aquaculture value chain involves various inter-connected and interdependent economic agents that add value to catfish product line such as input suppliers who produce fish feeds, sell feeds fingerlings and chemicals, catfish producers, processors as well as marketers of processed catfish both at whole sale and retail levels. Due to the need for aquaculture in Nigeria to satisfy the increasing demand for catfish, its growth of the industry has become a topical issue to the Nigerian Government during the last decade (Adeogun, 2012). With a demand estimate of 1.4 million tons, Nigeria is considered to be the largest consumer of fish and fish products in the African region. There is an annual demand deficit of approximately 0.7 million metric tons with imports covering the short fall at a cost of approximately 0.5 billion dollars per year (Kudi et al., 2008).

Table 1 shows an estimated steady growth in catfish production (MT) and job creation in catfish value chain in Nigeria (2004 - 2012). This was prompted by the presidential initiative on fisheries and aquaculture growth with strategic financing intervention options in 2003. Cooperative financial intervention was designed to empower catfish aquaculture value chain actors (input suppliers, producers, processors and marketers). The catfish aquaculture industry is therefore connected to functional value chain financing through cooperative approach as shown in conceptual framework in Fig. 1.

Cooperative loan scheme through which funds are made available to catfish farmers at a lower interest rate has been recommended for catfish feed producer, farmers, processors and marketers.

Therefore, the government encouraged cooperative society creation as a strategy to foster collective action aimed at increasing the productivity and efficiency of smallholder fish farmers.

Cooperative is an independent group of people united together to meet their common economic, social needs and goals through a business that is collectively owned and controlled democratically (ICA, 2005; Gábor, 2005). Cooperative societies have been reported to accelerate progress in aquaculture growth over the years (ICA, 2005; Gábor, 2005). Increase in output and income levels are measures of effectiveness of mobilization of savings and loan services of cooperative (financial capital) for catfish aquaculture value chain growth (Sharma et al., 2005; Alufohai and Okorosobo, 2013). Every stage of catfish aquaculture value chain requires cooperative financing (Effiong et al., 2012; Ibitoye 2012). Fish farmers joined a cooperative to meet their pressing financing needs to acquire relevant inputs. The growing concern of catfish aquaculture valuable contribution to economic growth has steered up various strands of research works (Durosh, 2008; Agbo (2009). Cooperative societies engaged in financial intervention for catfish production, processing, marketing and distribution activities (Hartley, 2003). Nweke et al. (2005) reported that cooperative societies intervene through direct agricultural input procurement such as chemicals, equipment, feeds, fingerlings and education of fish farmers on modern farming and management techniques. Few studies had examined the

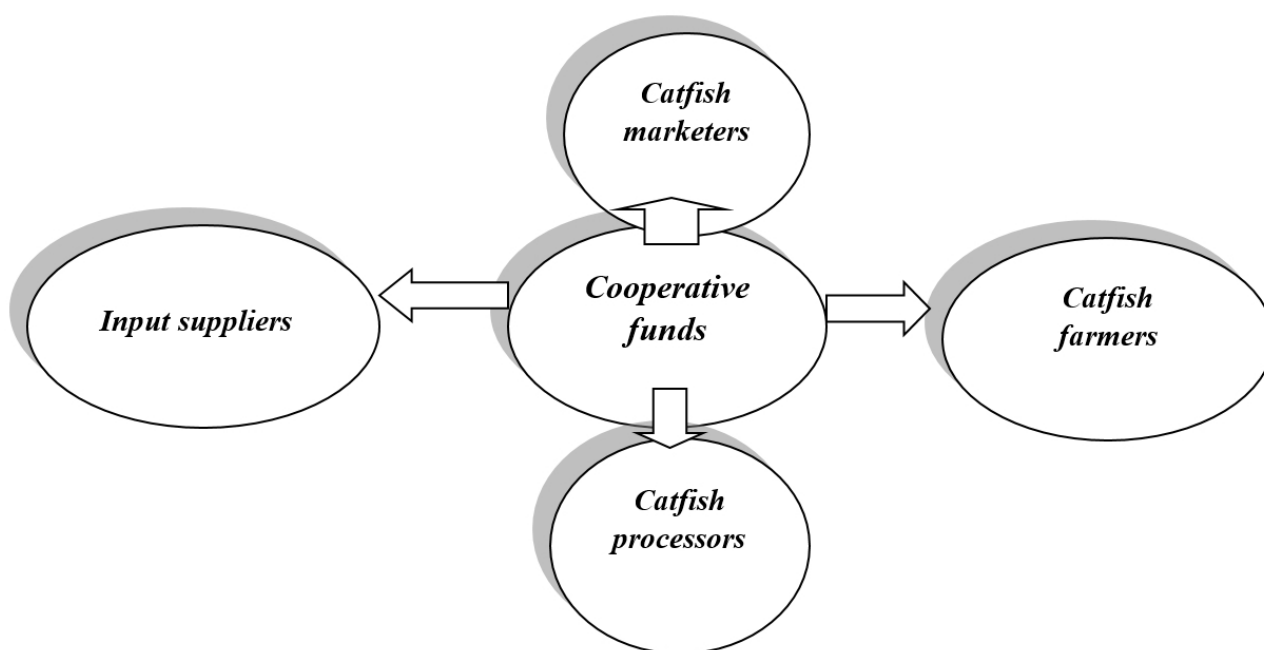


Fig 1. Cooperative funds distribution among value chain operators

Table 1. An estimated steady growth in catfish production (MT) and job creation in catfish value chain in Nigeria (2004 - 2012)

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012
<i>Clarias gariepinus</i>	35160	45084	67662	68100	115000	137516	180482	199015	228508
<i>Clarias hybrid</i>	703	902	1353	1362	2300	9168	12032	13268	15234
<i>Heterobranchus sp</i>	2637	3381	5075	5108	8625	6112	8021	8845	10156
Total	38500	49367	74090	74570	125925	152796	200535	221128	253898
Total job creation: production & marketing	38500	49367	74090	74570	125925	152796	200535	221128	253898

growth response of fisheries sector to external financing through Nigerian Agricultural Cooperative loan (Olaoye et al., 2012).

Using income growth as a proxy for development and productivity of fish farms, they found that the beneficiaries' income level increased substantially over time after receiving cooperative loans. They recommended a scaling-up of the fisheries sector's cooperative funding to boost further growth. The major constraints hampering the growth of the value chain of aquaculture (shrimp), as stated by Achoja (2019), are high feeding costs, insufficient finance and poor marketing network. Agricultural cooperatives support about 71% of fishery production in the Republic of Korea and 40% in Brazil (ICA, 2007). But in Nigeria, as it stands, studies on the effect of cooperative financial intervention on the growth of catfish aquaculture are scarce. Consequently, the frontier of understanding needed for relevant policy formulation ought to be extended. This is information gap that the present study examined and filled. The broad objective of this study was to examine how the growth of catfish aquaculture value chain has responded to cooperative financial intervention in Delta State, Nigeria. The specific objectives of the study were to:

- i) identify the operators in catfish aquaculture value chain;
- ii) examine the operations of catfish aquaculture value chain;
- iii) determine the amount of cooperative funding accessed by aquaculture value chain operators in the study area;
- iv) assess the rate of catfish aquaculture value chain growth;
- v) estimate the profitability of catfish aquaculture value chain operators;
- vi) identify the constraints militating against catfish aquaculture value chain growth.

MATERIALS AND METHODS

Description of study area and sampling procedure

Delta State, Nigeria was affected by this report. One local administration area from each of the three agricultural zones was randomly selected. From the Ministry of Commerce and Industry's list of 3 Local Government Areas, 5 cooperative fish farmers' societies were randomly selected, each of which comprised 15 cooperative fish-farmers' societies in total. Eight cooperators are randomly selected out of fifteen cooperative fish farmers' societies selected, with a total of 120 respondents being randomly selected.

Data analysis techniques

Descriptive statistics and inferential statistics have been used to analyze data. The increase in the value of income of the value chain operators was used as a proxy for growth in the catfish value chain by the operators both before and after access to a cooperative loan.

Model specification

Cooperative members have achieved the constraints to aquaculture development on a scale of 4 levels. It uses a normal measuring standard. The answers to different limitations were calculated so that the highest ranking 4 was given for the reply showing the core extreme constraints. The answers have been divided into four points, which are shown below:

- a serious problem = 4;
- a moderate problem = 3;
- a minor problem = 2;
- no problem = 1.

This approach for evaluating constraints is useful since it distinguishes the less serious and important constraints.

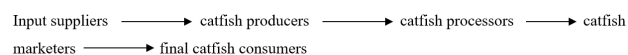
RESULTS AND DISCUSSION

Description of the operations of catfish aquaculture value chain in the study area

The input suppliers occupy the beginning of the value chain. They supply relevant inputs such as fingerlings, juveniles, feeds, drugs and chemicals to the producers. The producers, on the other hand, produce and sell marketable catfish to the processors. The processor processes and sells to catfish marketers. Processing after harvesting bulk (about 12.5%) of the catfish is sold live to market mummies (major distributors) at the farm gate, transported to market where they are purchased by *bukas* (local eateries) and individuals. Others buy to process by means of smoking and drying, using wood or charcoal. The catfish marketers are categorized into wholesalers and retailers. The wholesalers buy in bulk and sell in bulk to the retailers while the retailers sell in small units to the final catfish consumers. Catfish marketing in the value chain involves a wholesale buyer who could get to farm gate to buy the fresh catfish. They sometimes sell to small scale retailers who further sell to the retailers. Some individual buyers and retailers could buy fresh catfish at the farm gate.

Value Addition through smoking, drying and freezing methods are common in catfish value chain. Improved smoking and drying methods are often recommended to attain global standards.

The flow chart below depicts the aquaculture value chain.



The amount of cooperative financial intervention accessed by aquaculture value chain operators

Table 2 shows the distribution of cooperative credit accessed by various categories of catfish aquaculture value chain operators. The result showed that catfish processors accessed the highest amount of cooperative credit (₦320 000) (₦ = Nigerian naira). This takes 32.3% of the total financial intervention. Furthermore, the findings showed that input suppliers accessed ₦270 000 indicating 27.3% of total amount disbursed by cooperative society to catfish value chain operators in the study area. Catfish marketers accessed ₦220 000 (22.2%), while catfish producers accessed a mean amount of ₦180 000 (18.2%). These results indicate that catfish producers accessed the least amount of cooperative loan disbursed in the study area within the period under review. The consequence is that access to cooperative loans could stimulate business growth. As a result, Akerele and Adekunmbi (2018) have previously found that cooperative credit companies are highly productive and successful in helping members achieve their productive objectives and improve their standard of living in the Ogun State of Nigeria.

Table 2. Distribution credit accessed by catfish aquaculture value chain operators

S/N	Operators	Amount of cooperative loan accessed	%
1.	Input Suppliers	270,000	27.7
2.	Producers	180,000	18.2
3.	Processors	320,000	32.3
4.	Marketers	220,000	22.2
	Total	990,000	100

Income distribution of catfish value chain operators

Majority (46.67%) of them earned less than ₦100,000. About (35.83%) had an income of ₦100,000–₦200,000 while only 17.50% earned income above ₦200,000 The mean annual income of the cooperative farmers was ₦140,073.30.

Table 3. Income level of catfish value chain operators

Variable	Frequency	Percentage	Mean/mode
<₦100,000	56	46.67	
₦100,000–₦200,000	43	35.83	₦140, 073.00
>₦200,000	21	17.50	

Growth rate of catfish aquaculture value chain activities

The result showed that the mean income of the input suppliers before acquiring cooperative loan was ₦72,000, but after accessing the cooperative loan the income increased to ₦110,000 with a 53% positive growth rate. Similarly, the mean income of catfish producers before obtaining cooperative loan was ₦114,000 and after benefiting from cooperative loan the income level rose to ₦130,000 with a 14% positive growth rate. It is also revealed that the mean income of catfish processors before accessing cooperative loan was ₦80,000, but after acquiring the loan the income level increased to ₦124,000 with 55% positive growth rates. The income level of catfish marketers before accessing cooperative loan was ₦156,000 and after obtaining cooperative loan the income was increased to ₦184,000 with an increase of 18% positive growth rate. The result further showed that the mean growth rate for the entire catfish value chain operators was 35%. This means that cooperative funding is an important driver of the growth of catfish value chain. The implication of this finding is that any

Table 4. Growth rate of catfish aquaculture value chain activities

S/No	Cat fish value chain operators	Income before cooperative financial intervention	Income after cooperative financial intervention	% Growth Rate	Avg. Growth Rate
1.	Input suppliers	₦72,000	₦110,000	53%	
2.	Cat fish producers	₦114,000	₦130,000	14%	
3.	Cat fish processors	₦80,000	₦124,000	55%	35%
4.	Cat fish marketers	₦156,000	₦184,000	18%	
	Total	₦422,000	₦548,000		

development policy and programme on the growth of catfish aquaculture value chain must involve cooperative financial intervention in Nigeria.

Furthermore, catfish aquaculture value chain operators should belong to cooperative society so as to drive the growth of aquaculture sub-sector in Nigeria. This result supports the earlier report of Gbigbi et al. (2019) who reported that cooperative funding can enhance the development of aquaculture.

Distribution of catfish value chain operators

The distribution of credit value chain operators is presented in Fig. 2. The result shows that catfish producers (farmers) dominated the value chain (50%). This was closely followed by catfish marketers (21%). Further result showed that catfish input suppliers were up to 17% of the total number of operators in the value chain. However, 12% of the value chain operators were processors of catfish.

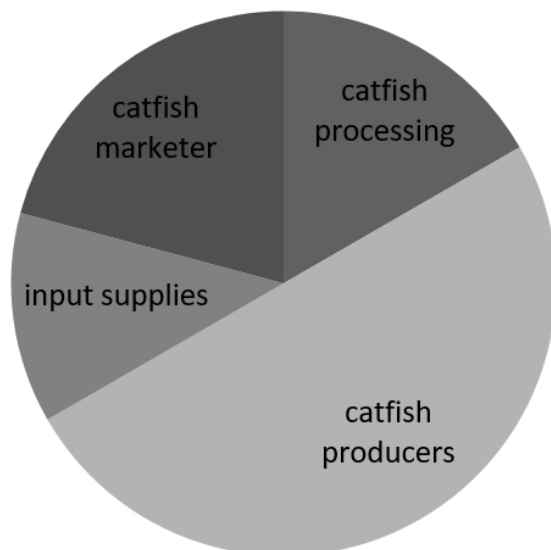


Fig 2. Distribution of catfish value chain operators

The implications of this finding are that (i) more people in the study area were interested in catfish production activities; (ii) catfish marketers are also more in number possibly because of the lucrative nature of the business.

Profitability of catfish aquaculture value chain operators

Table 5 shows the gross margin and profitability ratio of catfish aquaculture value chain operators. The value chain operators made profits from catfish with a gross margin of ₦324,750 and net income of ₦312,000 per annum. The BCR of 1.70 is greater than one. Judging from investment decision criteria, this implies catfish aquaculture is profitable. The ROI was found to be 0.70, which shows that for every naira invested, 70k was realized. The cost structure reveals that 16.14% of the total cost generated is to buy fingerlings, and 22.90% is to pay for labor salaries. The feeding costs measured 53.52 percent, the biggest cost. Prices for medications, pesticide prices, transport costs and fixed input costs accounted for 2.01%, 1.25%, 1.34% and 2.84%, respectively.

Constraints to catfish aquaculture value chain growth

Five items were listed on a four-point likert-type scale to estimate the relevant variables that were posed by cooperative farmers as constraints to aquaculture growth as shown in Table 6.

Inadequate access to the credit (mean=3.41), high input costs (mean=3.28), management inefficiency (mean=3.07), inconsistent policy (mean=2.82) and poaching (mean=2.66) are significant limitations in aquaculture production, all having mean values that were higher than the cut-off mark of 2.50, according to the Catfish aquaculture value chain. This would discourage aquaculture involvement.

Table 5. Cost and return of aquaculture value chain of operators

Production parameter	Amount (₦)	Percentage
Total revenue	760,400	
Variable cost		
Cost of fingerlings	72,350	16.14
Cost of feeding	240,000	53.52
Cost medication	9,000	2.01
Cost of fertilizer	5,600	1.25
Cost of labour	102,700	22.90
Cost of transportation	6,000	1.34
Total variable cost (TVC)	435,650	97.1
Gross margin	324,750	
Total fixed cost	12,750	2.84
Total cost	448,400	
Net income	312,000	
BCR	1.70	
ROI	0.70	

Table 6. Constraints of catfish aquaculture value chain growth

Constraints	SP(4)	MP(3)	MIP(2)	NP(1)	Score	Mean
High expenditure on inputs	70(280)	28(84)	7(14)	15(15)	393	3.28
Unstable policy	17(68)	68(204)	31(62)	4(4)	338	2.82
Poaching	29(116)	27(81)	58(116)	6(6)	319	2.66
Inadequate credit access	74(296)	28(84)	11(22)	7(7)	409	3.41
Management inefficiency	40(160)	60(180)	8(16)	12(12)	368	3.07

(Source: Survey data, 2018) Serious problem (SP) = 4, Moderate problem (MP) = 3, Minor problem (MIP) = 2 and Not at all a problem (NP) = 1 with a cut-off score of 2.50

CONCLUSION

This study investigated the effect of cooperative financial intervention on the growth of catfish aquaculture value chain with evidence from Nigeria. There is sufficient evidence to conclude that there are more catfish producers than any other operators in the value chain.

There is interdependence between catfish producers and input suppliers, processors and marketers in the value chain. Furthermore, catfish processors and input suppliers accessed more cooperative loan because their activities are capital intensive. The relatively high amount of cooperative fund accessed by these groups translated a high growth rate of 55% and 53%, respectively. The

major constraints to the growth of catfish value chain were inadequate credit access and high expenditure on inputs. Since all the value chain activities recorded an average of 35% growth rate, it is expected that overall growth of catfish industry will depend on cooperative financial intervention in Nigeria. More catfish farmers should be encouraged to belong to cooperative society. Summarized recommendations are: Operators in the catfish aquaculture value chain should be encouraged to attend workshops on management techniques to improve the efficiency of their businesses. Catfish inputs should be subsidized by the government.

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SAŽETAK

KOORPORATIVNO FINANCIRANJE I RAST LANCA VRIJEDNOSTI AKVAKULTURE SOMA U NIGERIJU

Model rasta poljoprivrednih tvrtki temeljen na korporativnoj suradnji postepeno dobiva na popularnosti u primjeni. Ova studija ispitala je učinak financijske intervencije na rast lanca vrijednosti akvakulture somovske vrste u Nigeriji. Primarni podaci prikupljeni su strukturiranim upitnikom od 120 sudionika u lancu vrijednosti akvakulture te su analizirani opisnim statističkim alatima, funkcijom troškova i povratka te 4-bodnom likert skalom. Rezultat pokazuje da je 32,3% i 27,3% prerađivača i dobavljača ulaznih materijala dobavilo 320.000 odnosno 270.000 ₦ (₦ = nigerijska naira). Samo 18,2% proizvođača zaradilo je 180.000 ₦. Rezultat ukazuje na postojanje više proizvođača nego bilo kojeg drugog subjekta u lancu vrijednosti akvakulture soma. Postoji međuovisnost između proizvođača i ulaznih dobavljača te prerađivača i trgovaca u lancu vrijednosti akvakulture soma. Nadalje, prerađivači i dobavljači ulaznih materijala vezanih za proizvodnju soma pristupili su višim iznosima zajma za suradnju zbog kapitalno intenzivne aktivnosti. Ove skupine lanca vrijednosti akvakulture soma pristupile su relativno visokim iznosima kooperativnog fonda što se preslikalo i na njihov visok gospodarski rast od 55%, odnosno 53%. Glavna ograničenja u rastu lanca vrijednosti akvakulture soma bila su nedovoljan pristup kreditima i visoki izdaci ulaznih sredstava. Operatorima u vrijednosnom lancu akvakulture soma bi trebalo osigurati pohađanje radionica o tehnikama upravljanja kako bi poboljšali učinkovitost svog poslovanja.

Ključne riječi: poljoprivrednici, zadružno društvo, akvakultura, rast, profitabilnost

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