

Full Length Research

Analysis of Pisciculture Value Chain in Lagos State, Nigeria

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Pisciculture value chain includes all steps a fishery business goes through from input sourcing and use to consumption by the end user. Value chain approach possesses numerous advantages such as quick returns on investment, creation of jobs and provision of high quality fish products to the consumers amongst others. Recent studies have shown that the inefficiencies in the pisciculture value chain are expressed in capacity under-utilization of equipment, poor quality products, low output from given quantity of raw materials, poor market information, poor technological know-how, income fluctuation, market gluts and unattractive profit incentives. Various studies have however, not fully underscored the important steps and stages in the analysis of the pisciculture value chain, and most especially in Lagos state, Nigeria, thus necessitating further in-depth analysis. This study therefore set out to analyze pisciculture value chain in Lagos state, Nigeria. The study adopted the survey design and utilized mainly primary data. A structured close-ended questionnaire was used to collect information from the fish farmers, who were selected by multistage, stratified random sampling technique. Data gathered was analyzed using value chain analysis. The study therefore recommended a strengthen networks between producers to address business issues by assisting value chain players to support each other for improving market perceptions of pisciculture product. Also, improving productivity and quality through increased adherence to technically correct pisciculture methods among other things

Key words: aquaculture, farming, fingerlings, enterprise, products

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BACKGROUND OF THE STUDY

Fish farming is an aspect of aquaculture which involves the cultivation of fishes in ponds, tanks or other chambers from which they cannot escape. A wide range of fish farming does exist including growing of fish in earthen ponds, concrete tanks, cages, pens, runways, glass tanks, acrylic tanks, plastic tanks, Raceways etc. (FAO Fish Stat Plus 2012). Pisciculture was derived from two words *Pisce(s)* which means fish (es) and *culture* which means rearing, raising or breeding of living things. Pisciculture is therefore defined as a

branched of animal husbandry that deals with rational deliberate culturing of fish or fishes to a marketable size in a controlled water body (Encyclopedia, 2009). Consequently, there are two main types of pisciculture to be distinguished: (1) the rearing in confinement of young fishes to an edible stage, and (2) the stocking of natural waters with eggs or fry from captured breeders (Encyclopedia, 2009).

Despite the fact that Nigeria is proudly considered as the most resourceful and vibrant African nation in the

aquaculture industry and currently the leading producer of catfish in Africa, “it is sad to note that it is still far behind in her efforts at reaching optimality (i.e. tapping the highest potentials from every resource use and production pattern) in fish farming, thereby often leading to artificial glut, low value of non-exportable aquaculture products” (FMARD, 2013). Due to these facts, value chain has gained more recognition and importance as a way of fighting poverty and achieving food security for fish farmers, this had been proven right that involving smallholder farmers in commercial value chains can boost their incomes and improve their food security.

Pisciculture value chain according to Hempel (2010) is therefore defined as every step, a fisheries business goes through from raw materials to the eventual end user. Value chain is thus a chain of activities; products pass through all activities of the chain in sequence and at each activity the product gains some value (Alam, Palash, Ali Mian and Mohan Dey, 2012). The chain of activities gives the products more added value than the sum of added values of all activities (FAO, 2011). Value chain therefore describes a high-level model of how fishery businesses receive raw materials as input (land, water, labour and capital), add value to the raw materials through various processes and sell finished products to customers (Alam et al, 2012).

The nature of value chain activities differs greatly in accordance with the types of fish production the farmer is involved in (Ardjosoediro, and Neven, 2008). Value chains for pisciculture differ between fish types as well as fish management and frequently within and outside various regions (De Silva, 2011). The goal is to deliver maximum value for the least possible total cost (FAO, 2011). The value chain framework shows that the value chain of a farmer or producer may be useful in identifying and understanding crucial aspects to achieve competitive strengths and core competencies in the marketplace (Dubay, Tokuoka, and Gereffi, 2010). Value chains have various strategies that focus on those activities that would enable the farmer to attain sustainable competitive advantage and are also tied together to ultimately create value for the consumer (Alam et al, 2012).

Furthermore, value chain offers the customer a level of value that exceeds the cost of the activities, thereby resulting profit margin (Da Silva et al, 2006). Cost advantage can be pursued by reconfiguring the value chains. Reconfiguration or structural changes of value chain refers to activities such as new production processes, new distribution channels or a different sales approach (United Nations Environment Programme (UNEP), 2009). Moreover, differentiation of value chains stems from uniqueness. Differentiation advantage may be achieved either by changing individual value chain activities to increase uniqueness

in the final product or reconfiguring the value chain (Wilkinson, 2006). Value chain enables rural residents to capture more margins from their farm produce, however, this is only possible if the credit and other constraints are resolved (Stanton 2000). Value chain analysis can help fish export of developing countries to be competitive in the international market (United States Agency for International Development (USAID), 2008).

PROBLEM STATEMENT

The absence of value chain in fish farming (pisciculture) enterprise had hindered the vast opportunities that exists in this venture waiting to be exploited, which will in all ways improve the profit margin of the farmers, create more job opportunities, increase the quality of produce delivered to the consumers also ensuring the availability of the produce all year round in Lagos state and beyond. Undeniably, there is a crucial gap on the analysis of factor-product relationship in pisciculture production and more significantly on the assessment of pisciculture value chain in the study area.

Up until now, only few research studies had been carried on value chain in Nigeria (Africa at large) not to mention pisciculture value chain in Lagos state, Nigeria. Few studies carried out on value chain are: *A study on the Value Chain Assessment of the Aquaculture Sector in Indonesia*” was conducted by Ardjosoediro and Goetz (2007); Ardjosoediro and Neven, (2008) further studied “*The Kenya Capture Fisheries Value Chain: An AMAP-FSKG Value Chain Finance Case Study*”; McFadden, G. et al. (2011), also conducted a study on “*Value-Chain Analysis of Egyptian Aquaculture*”; Russell and Hanoomanjee (2012) released a “*Manual on Value Chain Analysis and Promotion in Southern Africa*”; to mention a few. From the above-listed studies, it is obvious that very few studies (if any at the moment) are available on analysis of pisciculture value chain in Nigeria, and most especially in Lagos state, Nigeria. Due to the aforementioned scenario, this study therefore intends to bridge the research gap.

OBJECTIVE

The objective of this work is to conduct a thorough analysis of pisciculture value chain in Lagos State, Nigeria.

SIGNIFICANCE OF STUDY

The findings of the study will be useful for potential and practicing fish farmers, policy makers, researchers,

extension agents and the general public at large. It will aid potential fish farmers in their enterprise selection, resource use efficiency and production pattern decisions.

RESEARCH METHODOLOGY

Study Area: The study was carried out in Lagos state, Southwestern region of Nigeria. This state was chosen because of the abundance of pisciculture enterprises and endowment of the region with water bodies which facilitated the operational existence of fish farms as the major agricultural activity in this region. It is also very familiar to the researcher as it increased the ease of data collection. Lagos State was created on May 27, 1967 by virtue of State (Creation and Transitional Provisions) Decree No. 14 of 1967, which restructured Nigeria's Federation into 12 states (*Lagos State official website, 2013* - lagosstate.gov.ng). Lagos State is an administrative division of Nigeria, located in the Southwestern part of the country; with a land mass spanning over 3345 sq. km/1292 sq. m, lies between Latitudes 6°35'N of Equator and Longitude 3°45'E of Greenwich Meridian (C-GIDD (Canback Global Income Distribution Database), 2008) possesses a population of 9,013,534 million people (NPC, 2006).

Lagos state is located on four principal islands and adjacent parts of the Nigerian mainland. The islands are connected to each other and to the mainland by bridges and landfills (Encarta, 2009). Equally, the metropolitan areas (Colony Province) of Ikeja, Agege, Mushin, Ikorodu, Epe and Badagry were administered by the Western Region (Lagos State official website, 2013). The climatic weather condition of this region has made it favourable for fish farming to take place. It has also allowed for survival and multiplications of various fish species found in this environment (Encarta, 2009). Geographically, the state is located on the Bight of Benin (an arm of the Atlantic Ocean) (Encarta, 2009), which had made the people of Lagos state to engage mostly in fishing enterprises. It is a semi-tropical rainforest vegetation, and has a humid climate with a temperature of about 27°C (*Lagos State official website, 2013* - lagosstate.gov.ng).

Though, considered as the smallest in terms of area amongst Nigeria's states, Lagos State is arguably the most economically important state of the country, as well as it is the nation's largest urban area (C-GIDD, 2008) and most populated urban area in the whole of Africa (UNDP, 2003). Till date, it remains the center of commerce for the country. Lagos State is divided into five Administrative Divisions, which is then further divided into 20 Local Government Areas (C-GIDD, 2008). The first 16 of the LGAs are the Metropolitan Lagos while the remaining four LGAs (Badagry,

Ikorodu, Ibeju-Lekki and Epe) are within Lagos State but are not part of the Metropolitan Lagos. In 2003, many of the existing 20 LGAs were split for administrative purposes into Local Council Development Areas (LCDAs). These lower-tier administrative units now number 56. Table 1

SAMPLE TECHNIQUES

A multi-stage sampling technique was adopted for this study. Firstly, four (4) Administrative Divisions out of the five (5) in the state were purposively selected; and these include Ikeja, Lagos, Badagry and Epe division. This was due to the predominance of fish farmers in these zones. The second stage involved the purposive selection of two (2) Local Government Areas each from the above selected four (4) Administrative Divisions of the state, they are as follows: Alimosho, Kosofe, Eti-Osa, Lagos Island, Ojo, Amuwo-Odofin, Epe and Ibeju-Lekki Local Government Area. This is also mainly due to the predominance of fish farmers in this areas. The third stage involved random selection of three (3) communities from each of the eight (8) LGAs selected above. Lastly, the fourth stage randomly sampled five (5) fish farmers from each of the twenty-four (24) communities selected above. This gave a total of 120 respondents to be sampled. The researcher administered this questionnaire himself although sorted the help of extension workers in the state whenever the need arose.

DATA COLLECTION

A structured questionnaire was used for primary data collection. The population for this study was made up of all the pond fish farmers in this area. A total of one hundred and twenty (120) fish farmers who practice pisciculture and owned fish ponds in the area were sampled. Primary data was solely used for this study. This was gathered from the responses of those who practice pisciculture and own fish pond via interview and administration of structured questionnaire as well as informal discussion with fish farmers during the field survey.

Model Specification

Value Chain Analysis: -A typical value chain analysis can be performed in the following steps according to Dagmar (2001):

1. Analysis of own value chain –which costs are related to every single activity

Table 1: Administrative Divisions and Local Government Areas of Lagos State

LGA Name	Area (km ²)	Census 2006 population	Administrative capital
<u>Agege</u>	11	459,939	<u>Agege</u>
<u>Alimosho</u>	185	1,277,714	<u>Ikotun</u>
<u>Ifako-Ijaye</u>	27	427,878	<u>Ifako</u>
<u>Ikeja</u>	46	313,196	<u>Ikeja</u>
<u>Kosofe</u>	81	665,393	<u>Kosofe</u>
<u>Mushin</u>	17	633,009	<u>Mushin</u>
<u>Oshodi-Isolo</u>	45	621,509	<u>Oshodi/Isolo</u>
<u>Shomolu</u>	12	402,673	<u>Shomolu</u>
<u>Ikeja Division</u>	424	4,801,311	
<u>Apapa</u>	27	217,362	<u>Apapa</u>
<u>Eti-Osa</u>	192	287,785	<u>Ikoyi</u>
<u>Lagos Island</u>	9	209,437	<u>Lagos Island</u>
<u>Lagos Mainland</u>	19	317,720	<u>Lagos Mainland</u>
<u>Surulere</u>	23	503,975	<u>Surulere</u>
<u>Lagos Division</u>	270	1,542,279	
<u>Ajeromi-Ifelodun</u>	12	684,105	<u>Ajeromi/Ifelodun</u>
<u>Amuwo-Odofin</u>	135	318,166	<u>Festac Town</u>
<u>Ojo</u>	158	598,071	<u>Ojo</u>
<u>Badagry</u>	441	241,093	<u>Badagry</u>
<u>Badagry Division</u>	746	1,841,435	
<u>Ikorodu</u>	394	535,619	<u>Ikorodu</u>
<u>Ikorodu Division</u>	394	535,619	
<u>Ibeju-Lekki</u>	455	117,481	<u>Akodo</u>
<u>Epe</u>	1,185	181,409	<u>Epe</u>
<u>Epe Division</u>	1,640	298,890	

Source: (Lagos State official website - lagosstate.gov.ng)

2. Analysis of customers value chains –how does our product fit into their value chain
3. Identification of potential cost advantages in comparison with competitors
4. Identification of potential value added for the customer –how can our product add value to the customers value chain (e.g. lower costs or higher performance) –where does the customer see such potential

For the purpose of this study, two tools from the above listed analytical methods which are: (1) analysis of own value chain – which costs are related to every single activity and (4) identification of potential value added for the customer will be collectively adopted in order to achieve the objective of this study.

RESULT AND DISCUSSIONS

The guiding principle in the selection of cultured fish species as well as what stage to begin and end culturing of fish species include: growth rate of the fish, duration of production, cost of production, short food chain of the species, good table quality as well as readily available market which is a function of their demand.

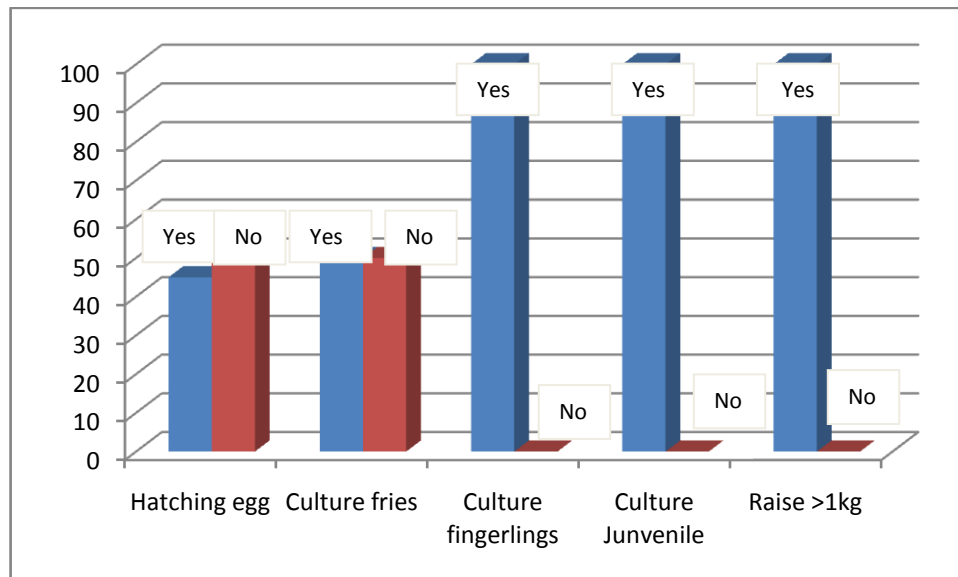
Steps in Pisciculture Enterprise

From Table 2, it can be noted that all (100%) respondents sampled culture fish from fingerlings to the acceptable market size of (>1kg). Only a few (45%) respondents engage in hatching eggs while the remaining few respondents (50%) begin production

Table 2. Steps of respondents in pisciculture enterprise

Value Chain Steps	Yes	Yes (%)	No	No (%)
Hatching egg	54	45	66	55
Culture fries	60	50	60	50
Culture fingerlings	120	100	0	0
Culture Juvenile	120	100	0	0
Raise >1kg	120	100	0	0

Source: Field survey (2014)



Source: Field survey (2014)

Figure 1: Depicts Steps in Pisciculture Enterprises

from culturing fries on their farms. Some of the reasons indicated by most of the respondents for not hatching eggs and culturing fries ranges from lack of water, lack of technical-know-how, poor handling methods and poor management skills amongst other factors. They also indicated that most (50%) of them would rather buy fries from other hatchers and start their production from there, as they believed that other stages are safer, less demanding and requires little or no technicality to survive. This is in line with the observation of Ali, Rahman, Roy, Haque and Islam (2009) who stated that the fry nursery trade in Jessore region has been developed based on the increasing seed demand all over the country as well as having an ultimate goal of meeting the seed supply for pond fish culture all over the country, also to solve the employment problems and improve socio economic condition of fish fry trade

community.

From the aforementioned statement, it is obvious that although fish fry culture is highly profitable, it must also be acknowledged here that it is also laborious and technically demanding, which dissuade unskilled fish farmers from delving into the business. The consequence for this is that most fish farmers will continually depend on the very few fish fry farmers who can only serve a very slim population in the larger population of fish farmers in the area. In line with Adewumi and Olaleye (2010), who quoted the *Federal Department of Fisheries statistical report of 2007*, stated that the minimum fish fingerling requirement in Nigeria is 4.3 billion while the total fingerling supply from all sources is 55.8 million, which is not enough to meet the fish farmers' demand. This result therefore leads to scarcity of fish fry, inflated or unstable prices

for the product as well as unhealthy competition for the products amongst fish farmers who desperately need the product for their own production. Adewumi and Olaleye (2010) therefore concluded that if the associated problems of production, especially the twin issue of feed production and fingerling supply are tackled, Nigeria will soon become a world exporter of fish.

On the other hand, the table further showed that all (100%) respondents participated in other stages of fish farming which includes culturing fingerlings, juveniles as well as culturing to market sizes (depending on the consumer preferences). This is in agreement with the observations of Oguoma, Ohajianya, and Nwosu (2010) and Agboola (2011) who stated that fish farming is a highly profitable venture as well as the level of profit did not significantly differ between the different areas. This is a good sign as many fish farmers get involved in fish production although many set their sight on profit alone, but there is more to the contribution of fish farming in this area as it contributes immensely to combating food insecurity, provide financial insurance and stability for fish farmers while other people involved in the chain of this enterprise get income via employment during the process of production. Furthermore, figure 4 clearly depicts the standings of fish farmers sampled on the particular stages they involve themselves within their enterprise. On a final note, this improvement in local production of fish in the country shows a good sign that the industry is moving away from subsistence level of production and now moving into commercial level, albeit small scale, production that is mostly prevalent in the country.

Value Chain in Pisciculture Enterprise

Table 3 indicated that majority (75%) of the respondents do not inculcate either of production or marketing value chain in their fish farming enterprise while only few (25%) do. Some of the fish farmers who do not practice value chain indicated some reasons such as lack of skills, time constraints and cost of labour amongst other things as their major reasons for not inculcating value chain in their enterprise.

The Figure 3 further depicts the categorization of respondents according to value chain inculcation in their fish farming enterprise. This result has a major effect on improvement of farmers average income, if farmers would continually resist the obvious importance of inculcating value chain in their business, the farmers will definitely continually and persistently lose a lot of their margin to marketers and food processors who buy at the farm gate at ridiculous prices that can barely cover the production cost of these fish farmers. Not only is profit been lost, extra jobs will also be lost along the

line and in addition to these losses, the fish products coming from the farmers will lack quality and barely meet the demands of numerous consumers in this area and beyond. The figure below (Figure 4) further depicts a clearer picture on the categories of fish farmers that inculcate value chain in their enterprise and those that do not.

Production Value Chain in Pisciculture Enterprise

Production value chain in pisciculture ranges from smoking to fish barbeque, but various farmers have different reasons for choosing a particular value chain. Market factors, costs of production and consumer preference are top of the reasons producers engage in various forms of value chain. Earlier in table 3, it was indicated that only 30 (25%) respondents inculcated both production and marketing value chain in their fish farming enterprise while the majority (75%) of the respondents do not. Table 4 therefore indicated that out of the total 30 respondents that inculcate production value chain to their fish farming enterprise, majority of the production value chain inculcated in pisciculture still remains smoking (25%), drying (25%), ice-freezing (21%) and closely followed by salting (14%) but other noted activities such as fish pepper soup, fish barbeque amongst others as alternative ways to add value to their fish products which mainly depends on the consumer demand.

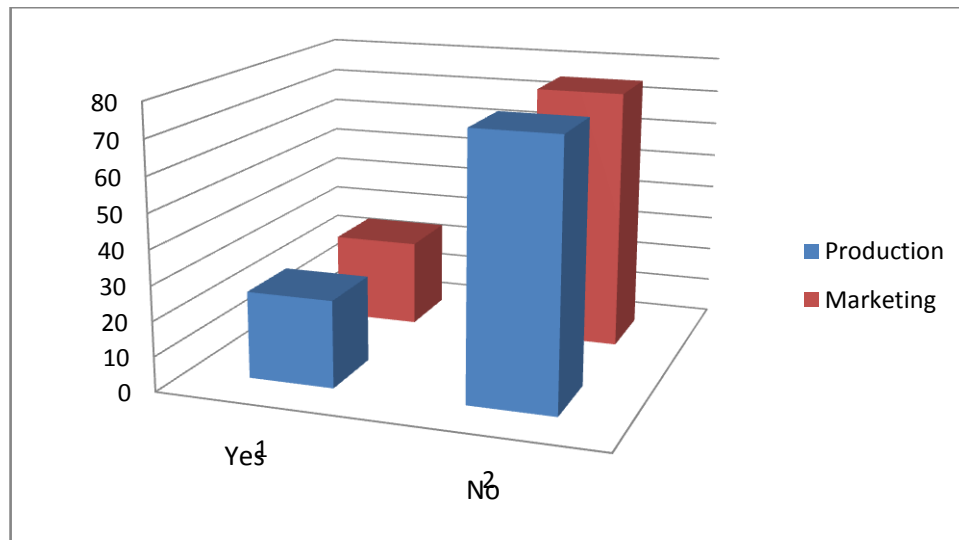
This is in line with the observation of PIND (2011) when it stated that domestic smoked fish demand in Nigeria is estimated to be as large as the fresh fish market, and increasing in markets far away from the coast. This is due to the fact that marketing/trading and smoking fish require low investment and basic technology, both attract large numbers of participants. Also, the huge market share controlled by both smoked fish and ice-freeze fish has led to their continuous attraction of more investors into this venture amongst other types of fish processing methods.

The result shown therefore agrees with the USAID report in the Cambodia MSME 2/BEE project (2010) which observed that processed products are still majorly limited to the traditional smoked fish, dried fish, Prahoc and Pa'orc. There is therefore potential in this value chain to develop markets for fillet and breaded fish products, which may be supplied by medium and large scale producers especially in this area. What this means is that value chain is yet to be widely accepted by majority of the fish farmers which has a negative influence on the quality of fish products available to the consumers as well as negatively influencing the amount of income and other margins that this enterprise brings along with it. Figure 3 further depicts a clearer picture of the status of fish farmers on value chain inculcation in

Table 3: Distribution of respondents participating in value chain

Value addition	Yes (%)	No (%)	Frequency (Yes)	Frequency (No)
Production	25	75	30	90
Marketing	25	75	30	90

Source: Field survey (2014)



Source: Field survey (2014)

Figure 2: Depicts respondents' status on value chain

Table 4: Type of Production value added by respondents in Pisciculture Enterprise

Production Value chain	%	Frequency
Smoking	25	19
Drying	25	19
Ice-freezing	21	16
Salting	14	11
Canning	0	0
Others	15	11
Total	100	76*

**Multiple Responses

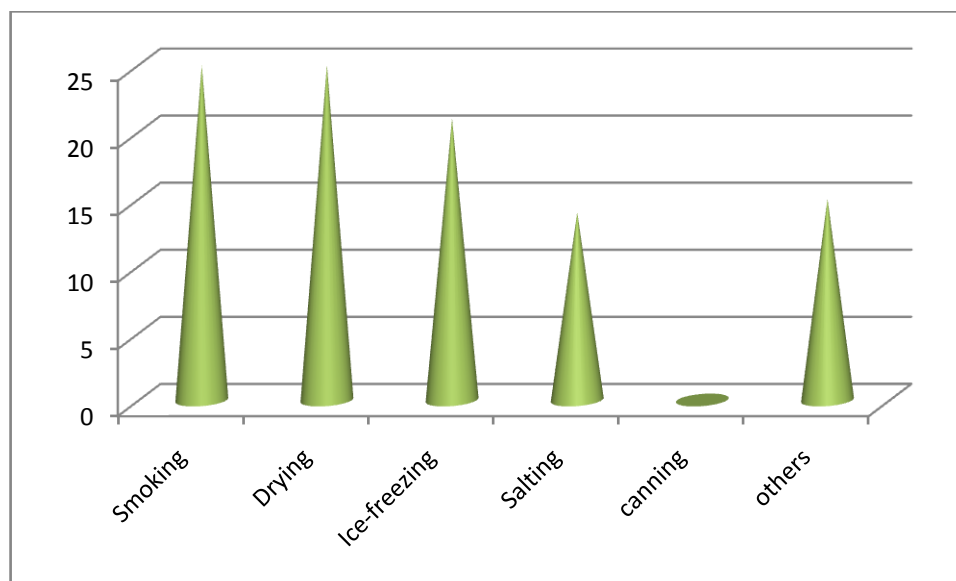
Source: Field survey (2014)

their enterprise in this area.

Marketing Value Chain in Pisciculture Enterprise

As indicated above in Table 4, only 30 (25%)

respondents inculcated both production and marketing value chain in their fish farming enterprise while the majority (75%) of the respondents does not. Table 5 therefore indicated that out of the total 30 respondents that inculcate marketing value chain to their fish farming



Source: Field survey (2014)

Figure 3: Depicts type of Production Value Chain Respondents Adopts in their Enterprise

Table 5. Type of market value added by respondents in Pisciculture Enterprise

Marketing Value chain	%	Frequency
Transportation	0	0
Packaging	31	20
Advertisement	23	15
Contract sales	46	30
Others	0	0
Total	100	65*

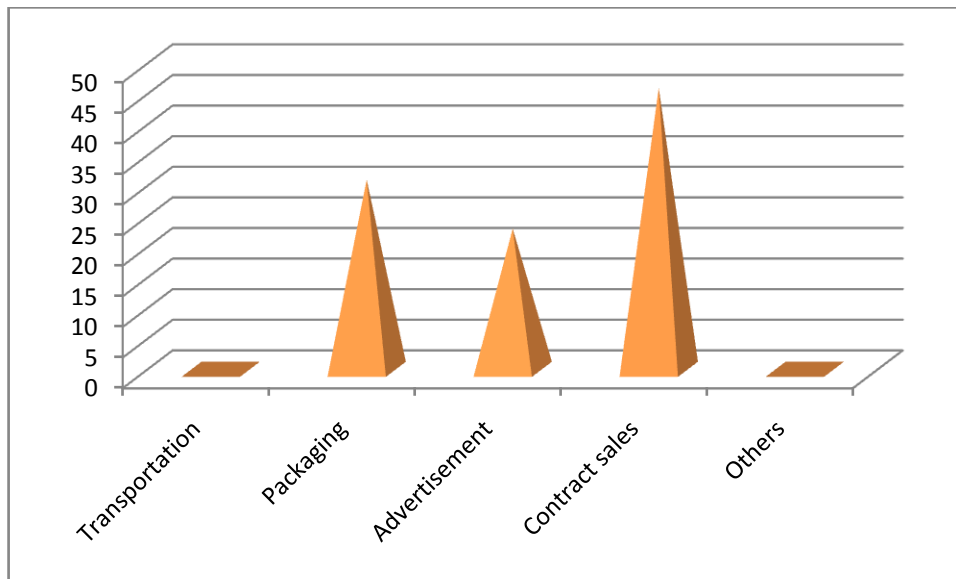
**Multiple response

Source: Field survey (2014)

enterprise, majority of the marketing value chain inculcated in pisciculture still remains contract sale (41%), packaging (31%) and closely followed by advertisement (23%). Worthy of note is that none of the respondents indicate utilizing other marketing pattern such as transportation or any other means outside the abovementioned methods. This is due to major concerns involved with transportation in terms of mode of transportation of fries and fingerlings which mostly contributes to about 20-30% mortality if the process is not properly carried out. Other issue with transportation is the bad road that is practically the same problem shared with other agricultural products in this area. As rightly put by Ali, et al. (2010), they observed that transportation of fry and fingerlings was a problem in the study area. Not only that the transportation system

as a whole was unsatisfactory here; the mode of conveying the fries and fingerlings also leaves much to be desired. The prevailing fry transportation system is traditional as described by Saha and Chowdhury (1956), and results in lowering of vitality of the fry and resultant mortality. Ali et al (2010). further noted that transportation problems had been reportedly noted to cause about 20-30% mortality of fry.

Furthermore, the result from Table 5 therefore agrees with PIND report (2011), which stated that the prevailing marketing dynamics have not helped the fish farmers' either. This is because small-scale production yields are low, in many parts of the country, small-scale farmers have been unable to assemble sufficient volume to attract serious, stable buyers. Instead, small-scale fish-farmers generally rely on a multitude of roving



Source: Field survey (2014)

Figure 4: Depicts type of Marketing Value Chain Respondents adopts in their Enterprise

wholesalers and traders, who are opportunistic and purchase with little regard for quality or long-term partnership. PIND (2011) further noted that given that marketing/trading and smoking fish require low investment and basic technology, both attract large numbers of participants. The atomistic nature of the sector and fragmented marketing carried out by a mass of mostly small to medium traders/wholesalers has challenged the sector. Challenges resulting from the structure of the industry involve not only the inability to consolidate sufficient volume, but also erosion of effective marketing strategies and prevention of the development of a common set of quality standards since everyone is off doing their own thing, without coordination, strategy or vision for the future. This has discouraged serious investment to grow the sector.

The prevailing marketing channels though short is fragmented, for both fresh and smoked fish, and its fragmented nature has also undermined sector growth by contributing to increased risk and uncertainty, whether perceived or real, for the subsistence producers. Such that small-scale producers, despite strong consumer demand for fish, remain conservative and unwilling to invest and grow their production possibilities. Consequently, a large percentage of the participants remain small and semi-subsistent or if commercial, they remain stagnant. The fragmented marketing channels are another serious constraint inhibiting the aquaculture sector.

This is therefore in support of the USAID report in the Cambodia MSME 2/BEE project (2010), which stated that there exist potential in pisciculture value chain to

develop markets for fillet and breaded fish products, which may be supplied by medium and large scale producers especially in this area. What this means is that value chain is yet to be widely accepted by majority of the fish farmers which has a negative influence on the quality of fish products available to the consumers as well as negatively influencing the amount of income and other margins that this enterprise brings along with it. Figure 4 further depicts a clearer picture of the status of fish farmers on value chain inculcation in their enterprise in this area.

Value Chain Analysis

From Table 6, one can be observed the breakdown of values as derived from every steps in pisciculture enterprise in this area. The above table showed that hatching of eggs requires only one week and it generates an average profit of ₦71,457.18 to the farmers while culturing of fries only generates on the average after two weeks a net profit of N16,928.36, while on the other hand, culturing of fingerlings requires a minimum of four weeks in order to generate an average profit of ₦467,856.72. Post-fingerlings culturing rakes in an average profit of ₦187,856.72 after four weeks while juvenile culture gives an average profit of ₦2,987,856.72 after four weeks while raising fish to market size which takes another four weeks produces on the average a profit of ₦1,542,223.29. It can be deduced that the highest profit in the chain of pisciculture enterprise remains culturing of juvenile and

Table 6: Breakdown of values derived from each steps in fish farming

Activities	Hatching of eggs	Hatchery – fries stage	Fries – Fingerlings stage	Fingerlings – Post fingerlings stage	Post fingerlings – Juvenile Stage	Juvenile – Market size (>1kg)
Duration in weeks	1week	2weeks	4weeks	4weeks	4weeks	4weeks
Quantity. raised	7.00	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00
Unit cost of fish raised (₦)	2,000	15	30	50	100	350
Cost of fish raised (₦)	14,000.00	210,000.00	420,000.00	700,000.00	1,400,000.00	4,900,000.00
Cost of Feed (₦)	80,933.33	161,866.66	323,733.32	323,733.32	323,733.32	323,733.32
Cost of Labour (₦)	3,740.00	7,480.00	14,960.00	14,960.00	14,960.00	14,960.00
Cost of land used(₦)	29,500.00	59,000.00	118,000.00	118,000.00	118,000.00	118,000.00
Cost of maintenance (₦)	2,023.33	4,046.66	8,093.32	8,093.32	8,093.32	8,093.32
Cost of fertilizer (₦)	245.83	491.66	983.32	983.32	983.32	983.32
Cost of medication (₦)	8,093.33	16,186.66	32,373.32	32,373.32	32,373.32	32,373.32
Cost of processing (₦)	-	-	-	-	-	36,039.68
Cost of storage (₦)	-	-	-	-	-	7,728.33
Cost of transportation (₦)	-	-	-	-	-	1,865.42
Quantity Sold	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00
Unit Selling Price (₦)	15	30	50	100	350	500
Revenue from Sales (₦)	210,000.00	420,000.00	1,400,000.00	1,400,000.00	4,900,000.00	7,000,000.00
Total Cost (₦)	138,542.82	403,071.64	932,143.28	1,212,143.28	1,912,143.28	5,457,776.71
Net profit (₦)	71,457.18	16,928.36	467,856.72	187,856.72	2,987,856.72	1,542,223.29

Source: field Survey, 2014

raising to market size respectively. It can therefore be suggested that fish farmers should avoid culturing of fries rather, should begin their production from fingerlings culture at least if they want to record better margins.

Recommendation

Based on the results of this study, the following recommendations were derived:

The pond fish farmers should:

- Avoid culturing of fries rather, should begin their production from fingerlings culture at least if they want to record better margins.
- There should be training and skill acquisition for these fish farmers on hatching of eggs and handling of fries to boost the supply of input in

the line of production.

- Embark on practices like formation of cooperatives that would enhance procurement of credit facilities and attraction of both government and Non-governmental agencies which would bring along essential inputs required for value chain pisciculture.
- Explore every available credit opportunities within their community, such as commercial banks, credit and thrift societies among others. Government could also place more emphasis on credit facilities toward agricultural production in general and fisheries in particular; such include Agricultural Credit Guaranteed Scheme Fund which enhanced credit availability to the farmers and taking care of tangible proportion of any default so as to encourage the commercial banks to make credit facilities available to farmers. The fish farmers should carefully consider an economic reduction in

fertilizer utility in the study area, thereby reducing the cost of production and raising the profit margin of their respective farms.

The Government should:

Structure and Institutionalize Business Information Outreach and Technical Support for pond fish farmers. This could be achieved by:

- Developing easy to use training materials and help train fingerling producers recognized by ADP to be certified pisciculture business trainers.
- Supporting the on-going dissemination of business and technical training material to a wider network of pisciculture producers through these fingerling producers, by assisting in setting up and providing feedback for the initial training sessions.

Strengthen Retail Market Information Networks by:

- Preparing consumer and retailer awareness materials to include benefits of pisciculture, how to select good pisciculture products, market hygiene, fish handling and storage.
- Facilitating the organization of retailer/trader business membership associations and forums to improve market infrastructure and link with producers.

Strengthen Networks between Producers to Address Business Issues by assisting value chain players to support each other for:

- Improving market perceptions of pisciculture product.
- Improving productivity and quality through increased adherence to technically correct pisciculture methods.
- Access to good quality seed.
- Managing feed prices.
- Developing market supply linkages.
- Securing access to credit through a series of facilitated working group sessions.

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