Quest Journals
Journal of Research in Agriculture and Animal Science
Volume 9 ~ Issue 6 (2022) pp: 87-91
ISSN(Online) : 2321-9459
www.questjournals.org

Research Paper

Study on the Supply Chain of Smoked Catfish in Selected Local Government Areas in Ibadan, South-Western Nigeria

B.O. Afolabi[1] and O.G. Akanbi[2]
[1](Department of Agricultural and Bio-environmental Engineering, Federal College of Agriculture, Nigeria)
[2](Department of Industrial and Production Engineering, University of Ibadan, Nigeria)

ABSTRACT: *An investigation into smoked catfish production was carried out with the aim of determining the nature of material flow from producers through to the consumers; the possibilities and constraint at the collection of fresh catfish, production of smoked fish and product distribution, and also, the observed environmental impacts. Questionnaires were employed to obtain relevant data of eighty (80) stakeholders and twenty (20) non-stakeholders in four selected local government areas (ISELGA, ISWLGA, ILGA, AND OLGA) participated in the study. Twenty to five, stakeholders to non-stakeholders were randomly selected from each local government area. The data obtained were analysed using Duncan Multiple Range Test (DMRT), with α = 5%, and some basic descriptive statistics. The results showed that the difference in education background of all stakeholders are not significant, also, in the years of experience ISWLGA and ILGA are significantly indifference, whereas OLGA is significantly higher than any others. The result showed that the business is sex bias, with minimum percentage male of 85% across three local government areas, except OLGA, where female is 60%. Across the local government areas, kilogram equivalents of fresh catfish after smoking are significantly different,while only in ISWLGA the difference between estimated costs involved in packaging finished product is significant. Response of non-stakeholders revealed that air pollution has highest environmental impact of 70%, while water pollution is 20% and improper disposition of by-products has 10%. It is assumed that the information achieved through this study will assist the stakeholders in smoked catfish business embraces better process flow and develop an effective processing and handling management which would make it more environmental friendly, and thereby open doors to anticipating stakeholders. It is hereby recommended that similar study should be carried out in other sections of the country.*

Keywords *–Catfish, Environment, Impacts, Smoked, Supply-chain, Stakeholders*

R*eceived 15 June, 2022;* ***R****evised 28 June, 2022;* ***A****ccepted 30 June, 2022* © *The author(s) 2022.*
P*ublished with open access at* ***www.questjournals.org***

I. INTRODUCTION

During the recent two decades, goods flow has been tremendously increased, even though the amount of goods remains at the steady state. Increased variety of goods, the just-in-time delivery system, low load rate, specialization and centralization of production systems, globalization of marketing and seasonal variations are among the main challenges of logistics system which may lead to the necessity of developing effective logistics in the sector [1]. [2]Had submitted earlier that effective logistics requires delivering the right product, in the right quantity, in the right condition, to the right place, at the right time, for the right cost and it has a positive impact on the success of the partners in the supply chain. Also, he consolidated his submission some years after that, effective logistics and technologies are a critical success factors for both manufacturers and retailers [3].

Food chain logistics is a significant component within logistics system as a whole. [4] put forward that, the food sector plays a significant role in economy being one of the main contributors to the gross net profit of many countries, particularly in developing countries. According to the European Commission, the food and drink industry is one of Europe's most important and dynamic industrial sectors consisting of more than 300,000 companies which provide jobs for more than 4 million people.

The current trend in food value chain is characterized by three overriding features namely; Greater concentration of farms, food industries, and wholesalers into smaller number sizes, the evolution of integrated

supply chains linking producers and other stakeholders and ever increasing consumers demand for food quality and safety (food that is fresh, Palatable, nutritious and safe) and animal welfare [5].

However, till date, the linkage between logistics systems of the stakeholders in the agriculture and food supply chains is rather loose and fragmented. Even within individual firms, the vertical and internal integration as related to freight and logistics is loose, and therefore they are both economically and environmentally inefficient and not sustainable. In this regard, effective and efficient logistics will be a critical success factor for both producers and retailers [6]. Additionally, [7] submitted that, the increase in transport of agricultural and related goods in the recent decades, empty haulage is common in agricultural sector and the load capacity utilization level of vehicles is very low (it varies between 10 and 95%). Therefore, efficient use of vehicles could be among the methods to reduce transport work and attenuate negative environmental impact.

Nigeria has high potentials for aquaculture development and thus potentials can be realized substantially through extension services [8]. Some years back, [9] observed that, it has been shown that Nigeria can substitute fish importation with domestic production to create jobs, reduce poverty in rural and peri-urban areas where 70% of the population live and ease the balance of payments deficits.

[10] reported that Nigeria's fish demand amounted to nearly 2.0 million MT (valued at more than $1.8 billion) in 2009, leaving approximately 600,000 metric tons of untapped market potential and about 800,000 metric tons valued at approximately $900 million, were imported fresh and frozen fish (mostly frozen mackerel, herring and croaker). The opportunity of bridging the widening demand-supply gap of fish in Nigeria through domestic production offers a great investment potential to the Nigerian populace and also the inflow of foreign direct investment into the country. Despite the increase of fish production in Nigeria, production level is still very low and this has been attributed to high cost of input, lack of credit to fish farmers at low interest rate, lack of skilled manpower and an ineffective aquaculture extension service system [8].

This research work is aimed to determine the nature of material flow in smoked catfish production and to investigate the possibilities and constraint at the collection of fresh catfish, production of smoked fish and product distribution so as to put forward a basis that may has positive influence on the supply and value chain for the catfish industry so as to migrate into international best practices. The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

II. MATERIALS AND METHODS

Sample Selection and Survey Procedure

Four local government areas in south western Nigeria, in Ibadan metropolis namely Ibadan south east local government (ISELGA), Ibadan south west local government (ISWLGA), Ido local government (ILGA), and Oluyole local government (OLGA) were selected to participate in the research. Eighty (80) stakeholders in catfish business were randomly selected to participate in the study with 20 stakeholders drawn from each selected local government areas. The research employed the use of the developed questionnaire after preliminary field survey to collect relevant data for the purpose of this study. The questionnaires were self-administered, in that the questions were being read out to the stakeholders and their responses were recorded respectively. Also, randomly selected people living close to the processing environments were interviewed in respect to the effect of the operations in their vicinity, and their responses were noted.

To ensure some level of reliability of recorded data, the data collected from each stakeholder within each local government area with relevant process flow were compared on the basis of the degree of consistency in the respective given information.

Data Analysis

The data was analysed statistically using Duncan Multiple Range Test at 0.05 level of significance and in some basic descriptive statistic to present the results for clarity.

III. RESULTS AND DISCUSSION

The results from the study areas are presented in Tables 1, 2 and 3, as well as in figures 1, 2 and 3. Theypresent the flow of material in smoked catfish production, the nature of primary collection and distribution of products (smoked catfish) alongside with their environmental impact in the study area.

Table 1 shows the demographic parameters of the stakeholders, which is limited to age, level of education, and years of experience in catfish smoking business. It is found that there is no significant difference in the level of education across all selected local government areas. Three local government areas (ISLGA, ISWLGA, and ILGA) have their age difference not to be significant, except OLGA (Table 1). The years of experience of the stakeholders in the business showed that, among the selected local government areas,

ISWLGA and ILGA are the same in their differences, while ILGA is significantly lesser, compared to OLGA which is significantly higher in years of experience than ISWLGA and ILGA (Table 1).

Table 1: Duncan Multiple Range Test (DMRT) for Demographic Parameter of the Stakeholders

LOCAL GOVERNMENT AREA	AGE	LEVEL OF EDUCATION	YEARS OF EXPERIENCE
ISELGA	2.00b	2.45	6.27b
ISWLGA	2.00b	2.18	7.09ab
ILGA	1.91b	2.18	7.18ab
OLGA	2.45a	1.73	8.09a
		Ns	

Ns: not significant α = 5%

Figure 2 shows that male population across the local government areas in percentage are 90%; 85%;

85%; and 40% for ISELA; ISWLGA; ILGA; and OLGA, respectively. The stakeholders within OLGA only are the local government area where female population dominated the business, while in others; it is male domination, with highest percentage in ISELA.

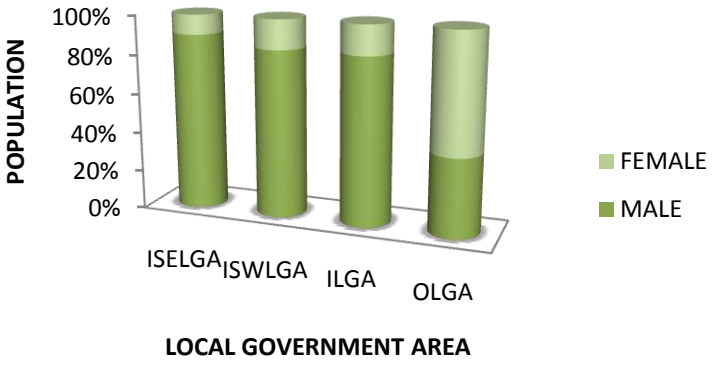

Figure 1: Frequency of sex of stakeholders within the study area

Process flow of smoked catfish as shown in table 2 indicated that there is no significant difference in cost of fresh fish, estimated cost for smoking, and expected time to smoke and cost of kilo equivalent of smoked fish across the study areas. The results showed that among the four local government areas, all kilo equivalents after smoking are significantly different,while only in ISWLGA the difference between estimated costs involved in packaging finished product is significant (Table 2).The variations noticed in body mass after smoking operations might be as a result of the nature of feed and/or type of energy utilized for smoking.

Table 2: Duncan Multiple Range Test (DMRT) for Process Flow of Smoked Catfish Production

LOCAL GOVERNMENT AREA	COST OF FRESH FISH PER KILO (₦/kg)	ESTIMATED COST UTILIZED DURING SMOKING (₦)	EXPECTED TIME TO SMOKE A KILO OF FRESH FISH (Hour)	KILO EQUIVALENT OF ONE KILO OF FRESH FISH AFTER SMOKING (kg)	ESTIMATED COST INVOLVED IN PACKAGING FINISHED PRODUCT (₦)	COST OF A KILO EQUIVALENT OF SMOKED FISH (₦)
ISELA	347.27	109.09	10.55	331.82^{a}	25.91^{a}	927.27
ISWLGA	347.27	114.55	11.09	326.36^{ab}	23.18^{b}	972.73
ILGA	350.00	114.55	10.73	316.36^{bc}	25.45^{a}	927.27
OLGA	349.09	107.27	11.27	313.64^{c}	25.45^{a}	927.27
	Ns	Ns	Ns			Ns

Ns: not significant α = 5%

Figure 2 presents two sources through which fresh catfish are being obtained by the stakeholders within the study area. It showed that stakeholders from less urbanised areas; ILGA are mostly into fish farming, followed by ISELGA, on the other hand, the ratio of self-rearing to purchasing are 11:9 and 12:8, respectively for ISWLGA and OLGA. Out of twenty (20) randomly selected stakeholders from each local government area, 19 and 17 stakeholders supplies their own raw materials for smoked fish production in ILGA and ISELA respectively. It may be inferred that, stakeholders from ILGA and ISELA faces lesser or no constraints during primary collection compared to other stakeholders from more urbanised areas; ISWLGA and OLGA who are into more of purchasing.

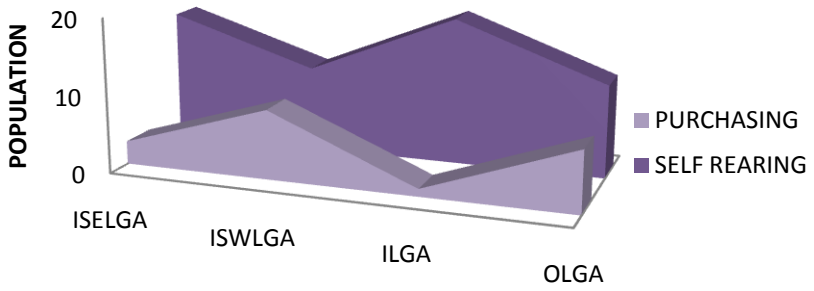

Figure 2: Sources of Raw Material for Stakeholders in Smoked Catfish Production

The analysis result showed that there is no significant difference in quantity of smoked catfish sold on daily basis and the daily returns as well as the cost of distribution across the study areas (Table 3). Interpreting the result, it is concluded that ISWLGA has highest daily returns which is corresponded to quantity sold on daily basis, while ILGA has the lowest in the same trend. Also, cost of distribution varied increasingly from ILGA; ISWLGA; OLGA; ISELGA.

Table 3:Duncan Multiple Range Test (DMRT) for Distribution and Revenue of Smoked Catfish

LOCAL GOVERNMENT AREA	COST INVOLVED ON AVERAGE IN DISTRIBUTING PRODUCT/KM (₦)	QUANTITY SOLD AVERAGELY ON DAILY BASIS(kg)	DAILY RETURNS ON AVERAGE(₦)
ISELGA	34.09	33.64	31,272.73
ISWLGA	32.73	34.55	33,727.27
ILGA	31.36	28.64	26,454.55
OLGA	33.64	29.55	27,272.73
	Ns	Ns	Ns

Ns: not significant α = 5% KM =kilometer

Pie chat in figure 3 showed the collected data from the people living around the study area in which smoked catfish production is being done, that the major environmental impacts in the production areas is air pollution (70%) followed by water pollution (20%) and others (10%) like improper means of disposing unwanted materials got from the production contributing to the untidiness of the environs.

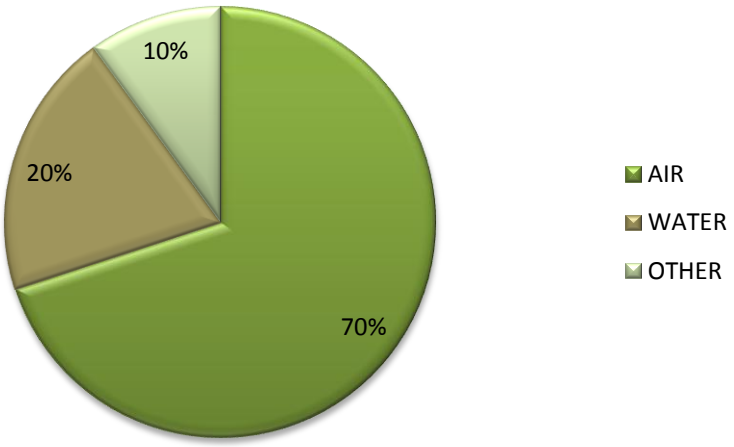

Figure 3: Impacts of Environmental Pollution in Smoked Catfish Production Areas

This study reveals that smoked cat fish business has two major sources for raw material (fresh catfish); it is either self-rear, or through purchase. The variations in body mass of equivalent kilogram after smoking may suggest different smoking methods, fuel type as well as the type of feed given to the raw materials; this may suggest dissimilarity in generated profit. Quantity distributed as well as revenue generated showed that there are variation in the demand rate across the study area. Due to associated costs to sourcing for fresh catfish, processing, packaging and distribution it is concluded that the chain links are close, and the flow is relatively more tilted to the advantage of the partner in the supply chain. In respect to the identified environmental challenges, it is therefore recommended that the stakeholders should employ appropriate technology and technical knowledge for proper processing, handling and management of entire process associated with fish smoking.

Acknowledgements

The authors acknowledge the assistance rendered by all stakeholders and non-stakeholders that devoted their time to supply the required answers to the questions in the questionnaire for the success of this study. Also to mention is Mr. Makanjuola, Dolamu Faith whose support is highly appreciated in the success of this study.

REFERENCES

[1]. L. Adams, Fish processing: Food Cycle Technology Source books (International Technology Publications, London, 1993).
[2]. B.B. Adekoya, Effective fish processing and storage Techniques for women in Agriculture. A paper presented at the training workshop on economic empowerment of women at the grass root in Ogun state. OGADEP Abeokuta, 1996.
[3]. B. B. Adekoya, Programme Planning for Fisheries Extension "Training Module 1" Workshop Paper on "Creation of a Critical Mass of Fisheries extensionists", (2001).
[4]. E.A.Obodai,. B.A. Muhammad, G.A. Obodai, and E.Opoku, Effect of Fuel wood on the Quality of Smoked Freshwater Fish Species Sold in Tamale Central Market, Northern Region, Ghana, Ethiopian Journal of Environmental Studies and Management, 2(2) 2009.
[5]. I.Chaston, Marketing in fisheries and Aquaculture, (Fishing News Books Ltd, England. Economists (NAAE), 2000).
[6]. W. L.Lawal, and E. O. Idega. "Analysis of fish marketing in Benue State."Proceedings of the 2004 Annual Conference of the National Association of Agricultural Economists (NAAE) held at ABU Zaria. 2004.
[7]. O. J.Olaoye, Dynamics of the Adoption Process of Improved Fisheries Technologies, doctoral diss., University of Agriculture, Abeokuta, Ogun State, Nigeria, (2010).
[8]. O. Oyinbo and G.Z. Rekwot, Fishery Production and Economic Growth in Nigeria: Pathway for Sustainable Economic Development, Journal of Sustainable Development in Africa. 15 (2), 2013 ISSN: 1520-5509
[9]. F. O. Areola, Fish marketing and export potentials of fish and fisheries products of Nigeria:A lecture delivered at educative and informative aqua-culture workshop and aqua-exhibitions tagged: sustainable fisheries livelihood, management and food security in Nigeria, 2007, 23pp.
[10]. M.Rondon, and U. Nzeka,Strong Demand Continues Expanding Fish Exports to Nigeria. Global Agricultural Information Network(GAIN),2010.