Original Research Article

Effect of Vertical Integration on Multidimensional Well-being of Fish Farmers in Lagos State Fish-hub, Nigeria

Opeyemi Eyitayo Ayinde, Hussain Kobe Ibrahim, Mercy Funke Salami, Lanre Ebenezer Ajibola

Department of Agricultural Economics and Farm Management, Faculty of Agriculture, P.M.B. 1515, University of Ilorin, Ilorin, Nigeria

Abstract

Vertical integration might be relevant to improve the well-being of farmers particularly when thinking of how economic innovation ensures high utilization of resource and promote economic prosperity in Nigeria. However, the relationship of such proposition is yet to receive empirical attention in the fish hub. This study uncovers the effect of the vertical integration on the multi-dimensional well-being of fish producers in Lagos State fish hub. The study was examined using primary data collected from 103 integrated and 60 non-integrated respondents. The data obtained were analyzed using descriptive statistics, Gross National Wellness (GNW) Index and Average Treatment Effect (ATE). The result of the GNW Index shows that both the integrated and non-integrated farmers ranked the indicators of multidimensional wellness in the same order. They were satisfied with their social relations (8.70); physical and health status (7.91); mental and emotional status (7.41); work and income status (5.87) as well as their economic and retirement status (5.68). However, they were dissatisfied with the political and government condition (4.73) as well as their living environment (3.77). The ATE result shows that the indicators such as the political and government intervention; mental and emotional; work and income were the components of multidimensional wellbeing that was improved by vertical integration decision of the farmers in the fish hub. However, social relations; physical and health; living environment wellbeing dimensions were not affected by the vertical integration decision of the respondents. It is therefore recommended that fish farmers should integrate themselves so as to enjoy government interventions, better income status and better emotional wellness all of which will improve their wellbeing.

Keywords: Average Treatment Effect; Fish Hub; Gross National Wellness index; Multidimensional Wellbeing; Vertical Integration.

INTRODUCTION

Vertical integration in agribusiness is widely considered as a promising opportunity for value creation in rural economies and agro-food industry (Barney and Hesterly, 2011). While it could support farmers in their effort to leave the perimeter of commodities through retaining bigger share of the value chain (Caracciolo and Lombardi, 2012), supply chain integration is deemed as a necessary strategy to optimize the production system, helping agro-food industry to face the global competition (Bertazzoli et al., 2011). The theme of integration in agribusiness is relevant either in academic, business and policymaking communities (Seuring and Muller, 2008; Martino et al., 2012).

Vertical integration (V.I.) is the one in which a firm combines activities which are not its present function but related to them in sequence of marketing activities.

The simplest meaning of V.I. is "ownership", i.e. when a firm owns two or more levels of production or marketing. A livestock/ fisheries feed company which feeds its own fish rather than sell the feed as a sole business is said to be vertically integrated. Likewise, a fish packer which owns retail stores and sells fish directly to consumers is vertically integrated.

The advantages of vertical integration are diverse: farmers may reduce price risk volatility by subscribing a minimum price guaranteed contract; industry can count on a stable supply in terms of quantity and quality. Moreover, farms may reduce transaction costs related to the search for buyers and benefit from technical assistance, the latter representing a certainty advantage for farms with limited economic size usually unable to access private agricultural extension services.

On the other hand, farming practices obligations and stringent quality requirements, that affect overall price generationmay represent a serious risk to farmers by

being legally trapped into a detrimental agreement due to the monopsonistic power of the industry. The latter aspects may partly explain the resistance to adhesion by farmers (Cembalo et al., 2014). Moreover, Huaiyu et al. (2011) found out that non-integrated vegetable farmers obtain higher farm income than their vertically integrated counterparts.

A review of aquaculture in Nigeria shows that only infinitesimal proportions of the resources available were being utilized. The reason is simply because the technologies (innovations) required to drive the resources to optimal utilization level have not been fully exploited. It is believed that the desire of drastically reducing fish importation can be attained by harnessing and exploring of the existing potentials, including vertical channel integration and innovations (Rahji et al., 2001).

The role of vertical integration on farm income has received a considerable attention despite the fact that there are conflicting views by the various researchers (Huaiyu et al., 2011; Carillo et al., 2016). However, to the best of our knowledge the effect of V.I. on farmers' wellbeing seems to be elusive. This appears to be a gap in research knowledge that must be filled. The thrust of this research is therefore to assess whether vertically integrated fish farmers experience better multidimensional wellbeing than those that are not integrated. The specific objectives include to: describe the socioeconomic characteristics of fish farmers in Lagos State fish hub; analyze the multidimensional wellbeing of the fish farmers in Lagos State fish hub and analyze the effect of vertical integration on the multidimensional wellbeing of the respondents.

MATERIALS AND METHOD

Study Area

The study was carried out in the Lagos fish hub of Nigeria. The hub is one of the aquaculture value chain innovation platforms in Nigeria and lies within the rain forest region of the country with large commercial and subsistence aquaculture. Lagos state is primarily an urban state with considerable agricultural activities undertaken in the state. Equally, 22 % of the land mass is made up of water bodies, which make fishing the major occupation of the citizenry. There are currently an estimated 350,000 farming families scattered throughout the Epe, Ikorodu, Lekki, Alimoso, Ojo and Badagry areas of the State, cultivating crops such as cassava, coconuts, plantain, vegetables and rice, and are also involved in livestock and fishing. The Lagos State agricultural policy aims to promote and support both large and small scale agricultural activities in the state. The Lagos State Marine Agriculture Development Programme (LASMADEP) for example aims to harness the state's aquaculture potential by accelerating fish

production. Opportunities exist in the 250 plot, 34 hectare Fish Farm Estate in Ikorodu, a project set up to promote fresh fish production. Another 400 plot estate on 60 hectares has been laid out at Ketu-Ereyu.

Sources of data

This study made use of primary data relating to the socio-economic characteristics of the selected farmers (integrated and not integrated), farmers' knowledge of vertical integration and the prevailing fish farming system, overall well-being and farm characteristics of the respondents. The primary data were obtained through the use of semi-structured questionnaire backed up with interview schedule.

Sampling technique

The simple random sampling technique was used to collect data for the study. The study area has a list of 6000 registered fish farming households scattered within three (3) fish farming zones namely: fish farm estate A, fish farm estate B, and coastal/inland fish farm clusters. From the fish farming zones, 163 fish farmers were randomly selected (which comprises of 103 Integrated Fish Farmers and 60 Non-Integrated fish Farmers) for the study.

Methods of Data Analysis

Descriptive statistics

Descriptive statistics such as percentages, frequencies and means were used to explain the socio-economic characteristics of the respondents.

The Gross National Wellness (GNW) index

The gross national wellness (GNW) index, also known as the gross national happiness (GNH) index was used to analyze the multidimensional wellbeing of the respondents. The GNW/GNH measure has been designed to fulfill the various criteria that are needed for an official national measure of well-being (happiness) that is relevant to national and district policy. The measure can be decomposed by variables such as zone or group, and the quality of life can then be broken down by dimension to identify which dimensions have the highest shortfalls in different regions or groups.

GNW/ (GNH) index is a socio-economic development and measurement framework that consists of seven (7) dimensions: economic, environmental, physical, mental, work, social and political. Most wellness areas include subjective results via survey and objective data. The subjective survey is structured into seven areas or dimensions and each area satisfaction rating is scaled from (0–10). Where (0) being very dissatisfied, (5) being neutral, (10) is very satisfied (Nordhaus and Tobin, 1972).

Table 1. Dimensions, Indicators, Measurements, Weights

Dimensions	Indicators	Measurement: Satisfaction rating scale from 0 to 10 "0" being very dissatisfied;"5"being neutral;"10" is very satisfied	Weights	
		Questions	I	D
Mental and Emotional	Positive thoughts	How satisfied are you with your positive thoughts?	1/4	1/7
	Negative thoughts	How satisfied are you with your negative thoughts?	1/4	1/7
	Positive feelings	How satisfied are you with your positive feelings?	1/4	1/7
	Negative feelings	How satisfied are you with your negative feelings?	1/4	1/7
Physical and Health	Physical Safety	How satisfied are you with your physical safety?	1/4	1/7
	Physical Health	How satisfied are you with your physical health?	1/4	1/7
	Cost of Healthcare	How satisfied are you with the cost of healthcare?	1/4	1/7
	Quality of Healthcare	How satisfied are you with the quality of healthcare?	1/4	1/7
Work and Income	Job	How satisfied are you with your job?	1/4	1/7
	Workplace	How satisfied are you with your workplace?	1/4	1/7
	Income	How satisfied are you with your income?	1/4	1/7
	Expenses	How satisfied are you with your expenses?	1/4	1/7
Social Relations	Family	How satisfied are you with family relationship?	1/5	1/7
	Friends	How satisfied are you with friends' relationship?	1/5	1/7
	Colleagues	How satisfied are you with colleagues' relationship?	1/5	1/7
	Neighbours	How satisfied are you with neighbours' relationship?	1/5	1/7
	Community	How satisfiedare you with community relationships	1/5	1/7

Note: Weights – I = Indicator; D = Dimension
Source: Adapted from International Institute of Management (2005)

The GNH Index is equal to 1 minus the product of two measures HA. GNH = 1 – HA

H is the headcount and represents the percentage of people who do not enjoy sufficiency in five or more domains.

A is the average proportion of domains in which people who are not yet happy still lack sufficiency. It shows the breadth of shortfalls.

Average Treatment Effect (ATE):

The Average treatment Effect was used to examine the effect of vertical integration on the multidimensional well-being indices of the fish farmers. Suppose that we have a binary treatment T, an outcome Y, and background variables X. The average treatment is defined as the conditional difference of treatment given background variables:

$$p(x) \overset{\text{def}}{=} \Pr(T = 1 | X = x)$$

RESULTS AND DISCUSSION

The mean age of the integrated farmers is 50 years while that of the non-integrated farmers is 47 years. The average household size was 4 for both integrated and non-integrated farmers. Majority (81.60%) of the respondents were married. Most (71.17%) of the fish farmers were males; 80.99% of the respondents had fishing as there major occupation. The average farm size of the respondents was 0.82 ha and most (82.21%)

of them were trained fish farmers. Majority (98.77%) of the fish farmers chose the occupation as a source of income.

Table 3 shows the result of the incidence of satisfaction across the various dimensions under the Gross National Wellness (GNW) index. The result reveals that both the integrated and non-integrated fish farmers ranked the dimensions of wellness in the same order. They were most satisfied with their social relations, ranking it first by both categories. This was followed by their physical/health status. Their mental/emotional status was ranked third; their work/income status was ranked forth. Their retirement conditions as well as the role of government were ranked fifth and sixth respectively. They were least satisfied with their living environment.

Using the GNW index, a score of 0 indicates very dissatisfied; 0.01–4.99 indicates dissatisfied; 5 indicates neutral; 5.01–9.99 indicates satisfied while a score of 10 indicated very satisfied. Therefore, the integrated and non-integrated farmers were satisfied with their social relations, physical/health status, mental/emotional status, work/income status as well as their economic/ retirement status. However, they were dissatisfied with the political/government condition as well as their living environment.

Wellbeing Satisfaction Level of Fish Farmers by Integration Status

From the methodology, a fish farmer is said to be multidimensional satisfied if its multidimensional

Table 2. Summary of socioeconomic characteristics of fish farmers by Integration Status

Characteristics	I.F. (n = 103)	N.I.F. (n = 60)	Pooled (N = 163)
Average age of farmers	50	47	48.6
Average Farmer's Household size	4	4	4
Educational status of Farmers (%)			
No Formal Education	9.70	10.00	9.81
Quran Education	2.92	3.33	3.08
Primary Education	18.45	18.33	18.40
Secondary Education	31.07	33.34	31.90
Tertiary Education	37.86	35.00	36.81
Marital status			
Married	88.35	70.00	81.60
Single	7.77	25.00	14.11
Divorced	1.94	3.33	2.45
Widow/widower	1.94	1.67	1.84
Gender			
Male	80.58	80	71.17
Female	19.42	20	28.83
Farmers with fish farming as primary occupation	86.41	71.67	80.99
% of farmers with access to Training	81.55	83.33	82.21
% of farmers with cooperative membership	100	96.67	98.77

Source: Field Survey, 2016
NB: I.F. = Integrated Farmers
          N.I.F. = Non Integrated Farmers

Table 3. Incidence of Satisfaction across Dimensions by Integration Status

Dimensions	Integrated farmers = 103		Non-integrated farmers = 60		Pooled, N = 163		Ranking
	WS	WA	WS	WA	WS	WA	
Social relations	889.5	8.64	528.0	8.80	1417.5	8.70	1st
Physical and health	801.5	7.78	487.5	8.13	1289.0	7.91	2nd
Mental and emotional	809.2	7.86	398.7	6.65	1207.9	7.41	3rd
Work and income	603.5	6.12	352.5	5.88	956.0	5.87	4th
Economic and retirement	572.0	5.55	353.7	5.90	925.7	5.68	5th
Political and government	515.0	5.00	255.2	4.25	770.2	4.73	6th
Living environment	369.0	3.58	245.0	4.08	614.0	3.77	7th

Source: Field Survey, 2016
WS = weighted score
WA = Weighted Average

wellbeing index exceeds the neutral cutoff point (n) of 5 or 50 percent. In other words, a fish farmer and his household is declared to be multidimensional unsatisfied if its multidimensional wellbeing index is less than the neutral cutoff point (n) of 5 or 0.5 or 50 percent. Furthermore, the maximum cutoff point (vs) of 10 or 100 percent indicates "multidimensional very satisfied"; range of 9.99–5.01 represent "multidimensional satisfied"; while the range of 4.99–0.01 represent "multidimensional dissatisfied",

and cutoff point (vd) of 0 indicates "multidimensional very dissatisfied".

Table 4 presents the estimated wellbeing index based on the value of the cutoff points, Very satisfied (vs) = 10, Neutral (n) = 5 and Very dissatisfied (vd) = 0. It can be deduced from Table 4 that the wellbeing measures increase with the level of cutoffs. Both groups (integrated and non-integrated fish farmers) were very satisfied with their social relations, with 46.60 percent and 48.33 percent for integrated and non-integrated farmers respectively. Also, 42.92

Table 4. Satisfaction levels of Integrated and Non-Integrated fish farmers

Wellbeing Dimensions	I.F (n=103)		N.I.F (n = 60)		Pooled (N = 163)	
	Freq.	%	Freq.	%	Freq.	%
Social relations						
Very satisfied (10)	48	46.60	29	48.33	77	47.25
Satisfied (5.01–9.99)	43	41.74	27	45.00	70	42.94
Neutral (5)	10	9.72	4	3.88	14	8.59
Dissatisfied (0.01–4.99)	2	1.94	0	0.00	2	1.22
Very Dissatisfied (0)	0	0.00	0	0.00	0	0.00
Physical/Health						
Very satisfied (10)	38	36.90	23	38.34	61	37.42
Satisfied (5.01–9.99)	37	35.92	29	48.33	66	40.49
Neutral (5)	19	18.44	5	8.33	24	14.72
Dissatisfied (0.01–4.99)	9	8.74	3	5.00	12	7.36
Very Dissatisfied (0)	0	0.00	0	0.00	0	0.00
Mental/Emotional						
Very satisfied (10)	38	36.90	15	25.00	52	31.90
Satisfied (5.01–9.99)	42	40.22	23	38.33	65	39.88
Neutral (5)	14	13.17	10	16.67	24	14.73
Dissatisfied (0.01–4.99)	10	9.71	10	16.67	20	12.27
Very Dissatisfied (0)	0	0.00	2	3.33	2	1.22
Work/Income						
Very satisfied (10)	17	16.50	11	18.33	28	17.18
Satisfied (5.01–9.99)	29	28.16	18	30.00	47	28.83
Neutral (5)	29	28.16	10	16.67	39	23.94
Dissatisfied (0.01–4.99)	28	27.18	19	31.67	47	28.83
Very Dissatisfied (0)	0	0.00	2	3.33	2	1.22
Economic/Retirement						
Very satisfied (10)	19	18.44	11	18.33	30	18.42
Satisfied (5.01–9.99)	16	15.53	15	25.00	31	19.02
Neutral (5)	34	33.01	14	23.33	48	29.44
Dissatisfied (0.01–4.99)	31	30.10	19	31.67	50	30.67
Very Dissatisfied (0)	3	2.92	1	1.67	4	2.45
Political/Government						
Very satisfied (10)	12	11.65	3	5.00	15	9.20
Satisfied (5.01–9.99)	15	14.56	11	18.33	26	15.95
Neutral (5)	35	33.98	17	28.34	52	31.90
Dissatisfied (0.01–4.99)	39	37.86	23	38.33	62	38.04
Very Dissatisfied (0)	2	1.94	6	10.00	8	4.91
Living Environment						
Very satisfied (10)	2	1.94	0	0.00	2	1.23
Satisfied (5.01–9.99)	13	12.62	13	21.66	26	15.96
Neutral (5)	18	17.48	17	28.34	35	21.47
Dissatisfied (0.01–4.99)	63	61.16	23	38.33	86	52.76
Very Dissatisfied (0)	7	6.80	7	11.67	14	8.58

Source: Field Survey, 2016
NB: I.F. = Integrated Farmers
N.I.F. = Non Integrated Farmers

percent of the respondents are satisfied with their social relations with 41.74 percent and 45.00 percent for integrated fish farmers and non-integrated farmers, respectively. This shows that the practice of vertical integration in aquaculture does not influence the social relations wellbeing of the fish farmers. Furthermore, very few households are either very dissatisfied or dissatisfied with the social relations, physical/health, and mental/emotional dimensions. Most of the households are dissatisfied in four dimensions, which include work/income; economic/retirement; political/government; and living environment dimensions. The integrated fish farmers have higher percentages compared to the non-integrated counterparts in these regards, indicating that these variables are affecting the multidimensional wellbeing of the integrated fish farmers, and can also be one of the reasons why non-integrated farmers are reluctant to practice the vertical integrated fish farming. For instance, the political/government interventions are not positively felt by the farm households. Also the practice does not really influence their economic wellbeing

Table 5. Average Treatment Effect (ATE) analysis results of the effect of Vertical Integration on multidimensional wellbeing of fish farmers

Wellbeing indices Components	Sample	I.F. n = 103	N.I.F n=60	Mean difference	Standard Error	t-value
Social relations	ATE	8.64	8.80	–0.16*	0.04	–5.83
Physical & Health	ATE	7.78	8.13	–0.40*	0.05	–7.87
Mental & emotional	ATE	7.86	6.65	1.07*	0.054	19.77
Work & Income	ATE	6.12	5.88	0.24**	0.059	4.09
Economic & retirement	ATE	5.55	5.90	–0.35	0.063	–0.31
Political & government	ATE	5.00	4.25	0.75*	0.054	26.39
Living Environment	ATE	3.58	4.08	–0.51*	0.049	–10.50

Significance level: **P<0.05, *P<0.10.
Source: Field Survey, 2016

significantly. More so, many integrated fish farmers were dissatisfied in the living environment dimension, with emphasis in the areas of urban planning, available utilities, level of infrastructure, and traffic situation indicators.

The results of the average treatment effect are given in Table 5. It shows the outcome of 103 Integrated Fish Farmers (treated) that were matched with 60 non-Integrated Fish Farmers (control). The results show that there is significant difference (negative) between the Integrated Fish Farmers and the non-Integrated Fish farmers in social relation, which implies that the non-Integrated fish farmers have better social relations than their integrated counterparts. Also, in the physical/ health and living environment wellbeing components, there are high significant differences (negative). This implies that the non-integrated fish farmers have better wellbeing in these components than the integrated fish farmers. However, the high significant difference (positive) observed in the political/government component implies that the integrated fish farmers are better off in this area compared to their non-integrated counterparts. This implies clearly that the integrated farmers are better off in terms of enjoying government interventions than their non-integrated counterparts. Furthermore, the significant difference (positive) observed also in mental/emotional and work/income components shows that the integrated fish farmers were better off in these areas of wellbeing than the non-integrated fish farmers.

CONCLUSION AND RECOMMENDATIONS

This study revealed that both the integrated and non-integrated fish farmers ranked their incidence of satisfaction across the various multidimensional well-being indices in the same order. They were most satisfied with their social relations followed by their physical and health status and least satisfied with their living environments. Indicators such as the political/government intervention, mental/emotional and work/income are the components of multidimensional wellbeing that were improved by vertical integration decision of the respondents in the fish hub. However, social relations, physical/health and living environment wellbeing dimensions were not affected by the vertical integration decision of the respondents. It is therefore recommended that fish farmers should integrate themselves so as to benefit from government interventions, have better income status and enjoy better emotional wellness.

REFERENCES

Barney J. B., Hesterly W. S. (2011): Strategic Management and Competitive Advantage: Concepts (4th Ed.). London: Pearson Education, 227 p., ISBN-13: 978-0132555500.

Bertazzoli A., Fiorini A., Ghelfi R., Rivaroli S., Samoggia A., Mazzotti V. (2011): Food chains and value system: the case of potato, fruit, and cheese. Journal of Food Products Marketing 17: 303–326.

Caracciolo F., Lombardi P. (2012): A new-institutional framework to explore the trade-off between Agriculture, Environment and Landscape. Economics and Policy of Energy and the Environment 3: 135–154.

Cembalo L., Caracciolo F., Migliore G., Lombardi A., Schifani G. (2014): Bioenergy chain building: a collective action perspective. Agricultural and Food Economics 2(1): 1–13. ISSN 2193–7532.

Carillo F., Caracciolo F., Cembalo L. (2016): Vertical integration in agribusiness. Is it a bargain? Rivista di Economia Agraria, Anno LXXI, n. 1 (Supplemento): 39–49. ISSN online: 2281–1559. DOI: 10.13128/REA18624.

Huaiyu W., Paule M., Nguyen T. (2011): Economic impact of farmer-driven vertical integration: the case of safe vegetable chains in northern Vietnam. 5èmes journées de recherche en sciences sociales à Dijon, INRA-CIRAD-SFER, pp. 1–19.

Martino G., Pampanini R., Morbidelli F. (2012): Integration policy in the agri-food chains: theory

and empirical evidences. Agricultural Economics/ Zemědělská Ekonomika 58(9): 409–424.

Rahji M. A. Y., Popoola L., Adebisi L. A. (2001): Analyses of the demand for and supply of fish in Nigeria 1986–1997. Journal of West African Fisheries 10: 543–550.

Seuring S., Müller M. (2008): From a literature review to a conceptual framework for sustainable supply chain management. Journal of Cleaner Production 16: 1699–1710.

Nordhaus W., Tobin J. (1972): "Is Growth Obsolete?" Economic Growth, National Bureau for Economic Research. New York: Columbia University Press, pp. 1–80.

Corresponding author:

Mercy Funke Salami
Department of Agricultural Economics and Farm Management
Faculty of Agriculture
P.M.B.1515.
University of Ilorin, Ilorin, Nigeria
E-mail: markmercy12@gmail.com