SOCIOECONOMIC DETERMINANTS OF INCOME FROM FRESH AND PROCESSED CRAYFISH MARKETING IN ORON LOCAL GOVERNMENT AREA OF AKWA IBOM STATE, NIGERIA

IGWE, K. C. AND IMADU, E. O.

Department of Agricultural Economics, Michael Okpara University of Agriculture,
Umudike, P. O. Box 2, MOUAU Post Office, Umudike, Abia State, Nigeria
igwe.kelechi@mouau.edu.ng; kayce_chima@yahoo.com
+234809445464

ABSTRACT

Regression analysis using the Ordinary Least Squares was fitted to data generated from forty two fresh and processed crayfish marketers respectively to assess the factors that determined income derived from their marketing. A total sample size of 84 crayfish marketers were in all randomly selected across three major Cray fish markets in Oron with a list of marketers generated from the Local Government Office. Age, educational status and purchasing cost were factors that determine the income derived from fresh crayfish marketing while household size and purchasing cost were the factors that determined the income derived from the processed crayfish marketing. It does appear that the income increases with education and age among fresh while with larger household size, more income is made among processed crayfish marketing. Only the purchasing cost that has significantly affected income among the two groups equally. When the data of the two groups were pooled, household size and purchasing cost were significant factors that affected income at 1% while the educational status of marketers alone was significant and positively related to income at 10%. The results of the test of equality between the two groups show that the estimated relationships differed significantly. The Chow's test shows the F-calculated (38.549) to be greater than the F-tabulated (2.56). It appears that more income is derived from the fresh crayfish marketing than from the processed. However, crayfish marketing need to be encouraged by government through formulation of policies that are aimed at encouraging more educated persons to be actively involved in its marketing and making credit facilities available to marketers as the business would seem to contribute to improving the household standard of living as more income would be generated through crayfish marketing given that most of the marketers are household heads.

Keywords: Determinants, income, fresh, processed, crayfish, marketing

INTRODUCTION

Nigeria, as a developing country, has a population growth rate of 3.5% per annum as against food production rate of 2.5% per annum (Ojo and Immoudu, 2000; Ilawole, 2005). This significant imbalance between food production and expanding population has resulted in an ever-increasing demand for agricultural products and thus placing a serious stress on virtually every aspect of the marketing system of every food product, particularly the indigenous food items and products. Seafood products such as crayfish have been identified in this

regard primarily because of its nutritional value and economic value to the people (Zhang, 2004).

Globally, crayfish has attracted some attention and contributed to the economy of some countries. In Louisiana, acclaimed the largest producers among the countries of the United States at a time, nearly 80 million pound worth of crayfish harvested is sold for food (UNDP, 2004). Crayfish produced in Nigeria is sold to food industry, although some is sold for recreational fish bait and very small amount marketed to the aquarium use and educators who use them as study specimens (Ilawole, 2005). Two major species namely the red swamp crayfish (*Procambarius clarkia*) and the white river crayfish (*Procambarius zonogulus*) are commercially harvested. However, the red swamp crayfish dominate the catch whether from the aquaculture or the natural fishery (Aromolaran, 2000). Crayfish is highly seasonal with the peak harvest occurring from March through June (Crane, 2000; Akande, 2000; Larkin *et al.*, 2002).

Crayfish harvesting in Nigeria is not as developed relative to what obtains in advanced countries and this naturally affects its marketing. In Oron Local Government Area of Akwa Ibom State in particular, marketing of this sea product is more difficult than its harvesting chiefly because it is not daily or weekly available as would other crops and livestock and its wild production (harvesting) is done by local farmers who produce them in small quantities. The demand for the product even from beyond the state has motivated many more persons to go into the harvesting of this sea product as well as its marketing (Ilawole, 2005). As many persons go into this business, it becomes imperative to examine the factors that affect the two categories of crayfish marketing for better understanding of ways to make crayfish marketing more effective.

METHODOLOGY

This study was conducted in Oron L.G.A of Akwa Ibom State, Nigeria. Oron is located between latitude 5^0 North and longitude 9^0 East at the right bank of the lower Estuary of the Cross River. It is situated between Mbo

Local government Area in the South and Okobo Local Government Area in the East, Esit-Eket Local Government Area in the North and Ibeno Local Government Area in the West.

Oron Local Government Area is found in the flood plain of South-Eastern Nigeria with the land mainly intersected by numerous streams and tributaries flowing into Cross River. The entire coastline stretches from Uya-Oron to Udung-Uko Local Government Area. Oron is a tropical region and has a uniformly high temperature all the year round. There are also two prevailing winds- the south-West onshore wind which brings heavy rain and North-East trade wind blowing across the Sahara desert which brings in the dry season.

Oron Local Government Area is inhabited by a good number of persons from other cultural background and has over time become synonymous with a city in the State with multi-ethnic outlook. Oron is known for crayfish production and marketing. Crayfish is either sold fresh or in processed form and can be purchased as low as possible depending on the sizes, qualities and quantities demanded (Czinkota and Ilikka, 2004).

A random sample of 84 respondents was selected in Oron local Government Area. Fourteen fresh crayfish and fourteen processed crayfish marketers were selected in each of the three markets viz: Idua beach market, Ibaka market and Oron central market. Structured questionnaire was the major instrument of data collection used. Data for this study were of primary origin obtained through the use of structured questionnaire complimented with oral interview. Information was collected on the following variables: age, household size, educational level, marketing experience, purchase cost, transportation cost availability of storage facilities and equipments among others.

Four functional forms of the Ordinary Least Squares regression model were fitted. These included linear function, semi-log function, exponential and double-log functions. The functions are implicitly stated as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8)$ … (1)

Explicitly, the functions are as follows:

Linear function

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + e$… (2)

Semi-log function

$Y = Inb_0 + b_1 \text{ In } X_1 + b_2 \text{ In } X_2 + b_3 \text{ In } X_3 + b_4 \text{ In } X_4, + b_5 \text{ In } X_5 + b_6 \text{ In } X_6 + b_7 \text{ In } X_7 + b_8 \text{ In } X_8 + e$…(3)

Double- log function

$InY = Inb_0 + b_1 \text{ In } X_1 + b_2 \text{ In } X_2 + b_3 \text{ In } X_3 + b_4 \text{ In } X_4, + b_5 \text{ In } X_5 + b_6 \text{ In } X_6, + b_7 \text{ In } X_7 + b_8 \text{ In } X_8 + e$…(4)

Exponential function

$\text{In } Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + e$ … (5)

Where Y = Revenue from crayfish marketing

X_1 = Age (years)

X_2 = Household size (in numbers)

X_3 = Educational level (years)

X_4 = Marketing experience (years)

X_5 = Purchasing cost (Naira)

X_6 = Transportation cost (Naira)

X_7 = Availability of storage facilities and Equipments (Availability of storage facilities =1, no availability of storage facility =0)

X_8 = Membership of trade Union (membership =1, not member = 0)

e = Error term.

The Chow's test was used to determine and compare the difference in income from fresh and processed crayfish in the study area, i.e. to test whether the two estimated relationships differed significantly. The model is specified thus according to Koutsoyiannis (1977):

$$\text{Chow's } F^* = \frac{\sum_{e3}^2 + (\sum_{e2}^2 \sum_{e1}^2)}{\frac{K_3 - (K_2 + K_1)}{\sum_{e2}^2 + \sum_{e1}^2}} \over K_1 + K_2$$

To verify the difference in the estimated relationship, Chow's test was used to test for the stability of the difference functions. Chow's F- statistics is computed as

$$F^* = \frac{\sum_{e3}^2 + \sum_{e4}^2}{\frac{K_3 - K_4}{\sum_{e4}^2}} \over K_4$$

Where

$k_1 = n_1 - m$ $k_2 = n_2 - m$, $k_3 = n_1 + n_2 - m$ and $k_4 = n_1 + n_2 - m$

n_1 = sample size for the first regression

n_2 = Sample size from the second regression

m = number of independent variables plus the intercept

$\sum_{e1}^2$ = Residual sum of samples from first regression
$\sum_{e2}^2$ = Residual sum of squares from the second regression
$\sum_{e3}^2$ = Residual sum of squares from the pooled regression
$\sum_{e4}^2$ = Residual sum of squares of the regression for the dummy variable

RESULTS AND DISCUSSION

Out of the four functional forms of regression analysis fitted to data for the fresh crayfish marketers, the exponential function was chosen as the lead equation and therefore was used for discussion. This was because on the relatively high level of R^2, F-value and significant variables of the estimated equation parameters. The value of R^2 of 0.733 implies that about 73.3% of variation in income was explained by the explanatory variables. The regression coefficients of age and educational level are significant at 5% and 1% respectively and are positive in the lead equation. This implies that the older the marketers and the more educated also they are, the more the income that they would accrue.

Educational level was positively related to the income of crayfish marketing indicating that as the educational level increase, income is increased. This is inconsonance with a priori expectation. An educated marketer is positioned for better investment and rational decision for increased income relative to the uneducated. Again, ones ability to reach more persons particularly for better bargaining is also enhanced with increased education. More so, the ability of the educated marketer to accept innovations for better marketing performance is higher than the uneducated counterpart. An illiterate marketer's judgement is not expected to be better than that of the literate marketer.

The purchasing cost was significant at 1% but positive in sign contrary to a priori expectation, indicating that the more the quantity of marketing input purchased by the marketers, the more income they would obtained and vice versa. According to Elhanah (2004), the increment in the purchasing cost will lead to the increase in selling price which will result in profit maximization in an enterprise. This situation is unique to the study area because crayfish is their treasured delicacy and are always sort for within and around the neighbouring communities. Being an inferior commodity whose income effect is higher than its substitution effect further explains the conflict in the relationship between income and purchasing cost.

For the processed crayfish marketers, the exponential functional form was chosen as the lead equation considering the values of the R^2, F-test and significant variables of the estimated parameters.

The coefficient of household size was found to be significant at the 5% level and positively related to income. This means that as household size increases income will also increase. Its implication is that the higher the household size of the marketers for each marketing period/season the higher their income from crayfish marketing. With increased household size, there are also more hands to help in the marketing activities particularly where the business is a household thing. The marketer therefore saves money that he could have paid hired workers and plows such back into the family business which in the long run enhances income that would accrue to him. This is contrary to the situation in fresh crayfish marketing where increasing the household size led to a corresponding decrease in income.

Purchasing cost is also significant at 5% and has positive effect on marketers' income. This means that income increase as the purchasing cost increases. The implication is that as the total cost of procuring the commodities by marketers increase with increase in purchasing cost, the expected income of marketers increases as the result of high price. This conformed to the literature that the rise in selling price of the commodity will definitely increase their income (Ayanwale, 2001).

To determine and compare the income of fresh and processed crayfish marketers, data from fresh crayfish and processed crayfish marketers were pooled together and chow's test was used to determine if there was any significant difference between the two regression analysis i.e. testing for equality and the intercept for heterogeneity. The result of the regression analysis is presented on table 3.

Semi-log functional form was the lead equation in the regression analysis of the pooled data to determine and compare the determinants of income of fresh crayfish and processed crayfish marketers in the study area. Semi-log functional form was chosen since it has the highest R^2-value, F-value and most significant variables of the estimated parameters. The coefficients of household size, purchasing cost and transportation cost are significant at 1% respectively and have positive relation to income. More so, the educational level is significant at 10% and also positive. Ilawole (2005) noted that the higher the transportation cost, which lead to increased price of crayfish, the higher the purchasing cost and the higher selling price of both fresh and processed crayfish.

There is a significant difference in the educational level of the marketers of both crayfish indicating that the persons involved in marketing of the fresh crayfish are more educated than the processed crayfish. The result of the chow's test shows that the F-calculated is greater than the F-tabulated i.e. 38.549 > 2.56. Therefore, we accept the fact that the two estimated relationships differed significantly. This implies that there is a difference between the income from fresh crayfish and from the processed crayfish marketing in the study area.

CONCLUSION

Multiple regression analysis was used in estimating the factors that affected the income from crayfish marketing and Chow's test was used to determine if there was any difference between the revenue of fresh and processed

crayfish marketers in the study area. The regression analysis results showed that age, educational level and purchasing cost are significant and positively related to income using exponential functional form for fresh crayfish marketing. The lead equation, exponential functional form was used also for processed crayfish marketers. Household size and purchasing cost were found to be the significant factors that positively affect income. The Chow's test results shows that F.* is greater than the F- tabulated i.e. 38.549 > 2.56 in the test that compared the difference in income between the fresh and processed crayfish.

Based on findings, government should embark on the construction of good road network and maintenance of the existing

ones as well as improve other

transportation facilities to ease the problem of transportation. The supply of fuel should be stabilized by the government while the importation of spare parts for the maintenance of the vehicle should be promoted. Enlightenment and encouragement of formal education to farmers and marketers will be of great help geared towards improving their level of marketing and income in terms sharpening their market performance ability.

REFERENCES

Akande, G.R (2000) The Importance of exports to sustainable livelihoods in small-scale fisheries sector: The Nigerian Experience Invited Paper Presented at DFID/FAO post-harvest workshop on Sustainable Livelihoods in Small-scale fisheries. Abidjan. Pp:8

Aromolaran, A.B. (2000) Poverty, Short term earning and fisheries management in Ondo State Coastal wetlands. J.Environs. Extension-, 1:57-62.

Ayanwale, A.B (2001) Agricultural Marketing Refocusing (1) Business Times, January 22-28, 2001 P.27

Brenkert G.G (2002) "Ethical challenge of Social Marketing" Journal of Public Policy and Marketing, 21 (spring), 14-25

Casoline, J.A and Andrew, R.T (2000) Growing Your Business in Emerging Markets: Promise and perils. Westport, CT: Quorum Books.

Cateora, P.R. and John, L.G. (2005) International Marketing, 12th edition. New York: McGraw- Hill/ Irwin. Journal of public policy and marketing.

Crane, A. (2000) "Marketing and the national Environment: What Role for mortality?" Journal of Macro marketing, 20 (December), 144-54.

Czinkota, M.R, and Ilkka, A.R (2004) International Marketing, 7th edition. Mason, OH: South-Western.

Elhanah, H. (2004) The Mystery of Economic Growth, Harvard University Press.
Food Marketing Institute (FMI) (2003). Consumer Trends In: The United States. Food Marketing Institute, Washington, D.C. Retrieved December 23, 2003 from http://www.fmi.org/.

Ilawole, A.O. (2005) Economic Analysis of production and Marketing of crayfish in Ilaje Local Government Area of Ondo State, Nigeria. A post-Graduate Diploma Thesis in the Department of Agricultural Economics, Federal University of Technology, Akure, Nigeria.

Larkin, S., Degner, R.L., and Rubinstein, E (2002) "Market preferences, Wholesale Demand and Breakeven prices for Marine Ornamental fish cultured and collected in Florida". Staff paper SP- 02- 5, department of food and Resource Economics, University of Florida, Gainesville, FL (73pp). Retrieved December 23, 2003 from http://agsurveys.org./RLRA29final report.Pdf.

Ojo, S.O and Imoudu, P.B (2000) Efficiency measurement of Palm oil Marketing in Ekiti State of Nigeria. African Journal of Business and Economic Research volume 1, No.2, Pp. 7-12.

United Nation Development Programme (2004) Human Development Report 2004. New York: United Nations Development Programme.

Zhang, X. (2004) An Evaluation of Factors Influencing Away-from-Home Consumption of Crawfish in the Gulf Region. A thesis Presented to the Graduate School of the University of Florida in Partial fulfilment of the Requirements of the Degree of Master of Science, University of Florida. 90p.

Table 1: Regression analysis result of factors that affecting revenue from fresh crayfish marketers.

Variable	**Functional Forms**			
	Linear	**Exponential** $^{+}$	**Semi-log**	**Double-log**
Constant	-18756.542	10.000***	-168038.0***	-.530
	(-1.407)	(26.844)	(-5.471)	(-.355)
Age	.414***	.230**	.338***	186*
(X_1)	(5.648)	(2.305)	(2.923)	(1.862)
Household size	0.45	.032	.021	.068
(X_2)	(.649)	(.335)	(.193)	(.720)
Educational level	.087	.279	-.052	.113
(X_3)	(1.155)	(2.717)	(-.433)	(1.084)
Marketing experience	.023	.097	-.130	.007
(X_4)	(.853)	(.780)	(-.719)	(.816)
Purchasing cost				
(X_5)	(10.725)	(7.218)	(5.994)	(7.862)
Transport cost	.046***	.151***	.051***	.089***
(X_6)	(.637)	(1.526)	(.467)	(.939)
Storage/equip facilities	0.10	.118	.054	.091
(X_7)	(.103)	(.882)	(.361)	(.705)
Membership	.014	-.055	.088	-.080
(X_8)	(.888)	(-.418)	(.254)	(-.626)
R^2	.855	.733	.674	.756
R^2-Adusted	.820	.668	.595	.697
F-value	24.421***	11.329***	8.538***	12.781***

Source: Field survey, 2009

*** Significant at 1%; ** significant at 5%; * significant at 10%, value in brackets are t-ratios

Table 2: Regression analysis result of factors that affect the revenue from processed crayfish marketers

Variable	Functional Forms			
	Linear	**Exponential** [+]	**Semi-log**	**Double-log**
Constant	-3973001	10.591***	73554977.0	4.130
	(-1.272)	(12.299)	(.492)	(.971)
Age	.104	.062	.172	.108
(X_1)	(.407)	(.316)	(.816)	(.544)
Household size	.407**	.398**	.126	.351*
(X_2)	(2.000)	(2.138)	(1.095)	(1.886)
Educational level	.273*	.205	.144	.127
(X_3)	(1.701)	(1.403)	(.842)	(.789)
Marketing experience	.015	0.34	-.007	-.011
(X_4)	(.071)	(.180)	(-.034)	(-.056)
Purchasing cost	-.146	.299**	-.303*	.301*
(X_5)	(-.932)	(2.090)	(-1.867)	(1.961)
Transport cost	-.176	-.078	-.019	.063
(X_6)	(-.1.057)	(-.515)	(-.109)	(.390)
Storage/equip facilities	.076	-.047	-.013	-.009
(X_7)	(.421)	(-.287)	(-.069)	(-.055)
Membership	.019	-.061	.030	-.059
(X_8)	(.105)	(-.377)	(-.169)	(-.349)
R^2	.254	.376	.220	.305
R^2-Adusted	0.73	.225	.031	.137
F-value	1.404	2.487**	1.163	1.812*

Source: **Field survey data, 2009**

*** significant at 1%; ** significant at 5%; * significant at 10%. Values in parenthesis are t – ratios

Table 3: Regression analysis result of factors that affect the revenue of marketers in both fresh and processed crayfish

Variable	Functional Forms			
	Linear	**Exponential**	**Semi-log +**	**Double-log**
Constant	-21913188	2545060.0	1.284	10.396***
	(-1.551)	(.411)	(.681)	(23.844)
Age	.003	.028	.098	1.259
(X_1)	(0.29)	(.227)	(-954)	(.212)
Household size	.230**	.195*	.242***	2.470
(X_2)	(2.039)	(1.700)	(2.519)	(.016)
Educational level	.218*	.164	.188*	2.138
(X_3)	(1.900)	(1.430)	(1.956)	(.036)
Marketing experience	.123	.103	.086	1.344
(X_4)	(1.001)	(.803)	(.803)	(.183)
Purchasing cost	-.057	-.217**	.475***	.430***
(X_5)	(-.501)	(-1.924)	(5.016)	(4.439)
Transport cost	-.019	.069	.138	.062
(X_6)	(-.164)	(.619)	(1.483)	(.645)
Storage/equip facilities	-.023	-.048	-.013	-.076
(X_7)	(-.191)	(-.395)	(-.126)	(-.741)
Membership	-.027	-.013	-.036	.002
(X_8)	(-.226)	(-.107)	(-.363)	(.022)
R^2	.108	.124	3.82	.355
R^2-Adusted	.013	.031	.316	.287
F-value	1.138	1.330	5.796***	5.167***

Source: Field survey, 2009

*** Significant at 1%; ** significant at 5%; * significant at 10%. The values in parenthesis are t-ratios.