Structure and Efficiency of Onion Market in Umuahia Area of Abia State, Nigeria

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Abstract
This study was conducted in Umuahia area of Abia State, Nigeria. Two Local Government Areas (LGAs) were purposively selected which is Umuahia south and Umuahia North. Two clans were purposively selected from each of the L.G.A'S, 15 Retailers were randomly selected from a central market in each of the clans making a sample size of 60 respondents. Descriptive statistics, Gini coefficient, cost and returns analysis and Regression models were the analytical tools employed. Result showed that the market was competitive with a Gini coefficient of 0.46 which implied that the market was competitive and tends towards perfect market. The result also showed that the business was profitable with an average net return of ₦12,020 in a month. The significant variables that influenced marketing efficiency were cost of transportation, volume of sales, level of education and amount of credit used. Major problems of onion marketing includes; high cost of transportation , insufficient capital, inadequate and unreliable market, weather condition, competition ,and spoilage. The study recommended that structural reforms that can improve marketer's access to loans and credit should be encouraged so as to induce higher rate of competition for sales in market. The significant variables that influenced marketing efficiency should be considered in policy issues.

Keywords: Onion, Structure, Efficiency, Marketing.

1.1 Background of study

Onion (*Alluim cepa*) is one of the most important vegetables in Nigeria, belonging to the family *leliaceace* (Alabi and Adebayo, 2008). Its economic importance cannot be over emphasized. It is highly rich in vitamin C and it is a good source of dietary fibers and folic acid. More so, it is ranked second most important vegetable after tomato in Nigeria (Hussaini *et al*, 2000). It was observed that in the year 2011, 4277,647 tons of onions were produced in Nigeria, making the country the fifth onion producing country in the world (FAO, 2002). According to Pelter *et al* (2000) cultivation of this crop has developed steadily in tropical areas for more than 40 years.

Onion is one of the vegetable of focus under Agricultural Transformation Agenda (ATA) of the Federal Government of Nigeria. Onion (*Allium cepa*) is mainly grown in Nigeria, Niger, Ethopia, Burkina Faso and Senegal. It is exclusively cultivated throughout the country under a wide range of climatic conditions and it can be biennial, triennial or a perennial crop. The total surface area dedicated to onion crop in the world has doubled reaching a percentage figure of 2.74 million hectare (Pelter *et al*, 2000) (FAO, 2002). The growing of onions is empowering and rewarding, it cuts across different class and culture. Onion consumption is spread throughout the year and there is a constant demand for onion all year round. Hence, it possess a problem because most of the onion produced in Nigeria comes from the Northern part of the country, such as Kano, Sokoto, Borno, Bauchi, Jigawa, Kastina, Zamfara (Inuwa,2001).

However, Obasi and Emenam (2014) asserted that marketing usually begins at the farm, when the farmers harvest his products. The product when harvested cannot get to the consumer; firstly, it is likely to be located some distance from the place of consumption in a regular and continuous manner, throughout the year. Secondly, storage is required to adjust supply to meet demand. Thirdly, a product, when it has been harvested, is rarely in a form acceptable to consumers. Hence, it must be sorted, cleaned and processed in various ways and must be presented to consumers in convenient quality and quantities for sale (Asogwa and Okwoche, 2012). Also, Nemeth *et al* (2007) states that onion is marketed mainly as a fresh fruit vegetable and features prominently in most household consumption needs. Seasonality as well as cost and location to the market may influence distribution from producers to consumers. On the other hand, onion marketing during the rainy season creates glut in the market due to the fact that many of the farmers and sellers do not have storage facilities, thereby leading to very low returns of the crop per hectare.

The need for market structure analysis in Agricultural marketing has been emphasized (Cloidus and Mueller, 1967, Obasi and Emenam, 2014). The marketing of onion in Umuahia has not received adequate research attention especially with regard to the nature of competition and efficiency of the marketing system.

Many problems affect Agricultural commodity marketing which includes distance, cost of transportation, seasonal variation, storage, processing, grading and communication among others as hindrance to the flow of goods in the Agricultural sector (Alabi and Adebayo, 2008). Over the years, there have been inefficiencies in the marketing of agricultural commodities including onion as a result of these problems. Onion is transported from north to the east; thus, the distance has led to increased cost of transportation of onion and inadequate storage facilities has resulted to the destruction of these products (onions) by heat and also causing it to germinate before it gets to the final consumers leading to losses and influencing the efficiency of the marketing system.

The distorted marketing channels and the price fluctuations constitute a problem in the area. In the midst of the various problems bedeviling agricultural marketing in developing economies, research attention will continue to interrogate the levels of efficiency from different dimensions in order to suggest strategies for improvement. The objective of the study is to analyze the structure of onion market, examine the marketing efficiency and its determinants, examine the marketing cost, returns and identify the problems facing onion marketing in the study area.

2. Research Methodology
2.1 Study Area
The study was conducted in Umuahia area of Abia State, Nigeria with coordinates: latitude 5^0 32"0" and longitude of $7^029'0'$ comprising Umuahia north and Umuahia south L.G.A. Umuahia north shares boundary with Bende L.G.A, Ikwuano L.G.A, Umuahia south L.G.A, Imo state and Isiukwuato, while Umuahia south L.G.A shares boundary with Isiala Ngwa North LG.A, Ikwuano L.G.A, and Imo state. Umuahia North has two clans which are Ibeku and Ohuhu with about 45 villages while Umuahia South L.G.A has three clans which are Olokoro, Ubakala and Umuokpara with about 35 villages. Both Umuahia south L.G.A and Umuahia North L.G.A are among the seventeen L.G.As in Abia State. The primary occupations of the people are farming, civil service, artisanship etc. The major foods grown in these areas are maize, melon, cassava, yams and vegetables. Tree crops such as cocoa and oil palm are also planted. The soils are fertile even though the people often times make use of fertilizer to

increase fertility, thereby improving productivity. Commercial and economic activities such as trading and marketing of goods and services are performed through the markets.

2.2 Sampling Method

A multi-stage sampling procedure was used in the study. Firstly, a purposive sampling technique was used to select the L.G.A's (Umuahia North and Umuahia South) due to its proximity and accessibility. Secondly a simple random sampling technique was used to select two clans from Umuahia north which are, Ohuhu and Ibeku and two clans from Umuahia South which are Ubakala and Olokoro, fifteen retailers were selected from a central market in each of the clans. The lists of the retailers were obtained from the retailers unions in each of the selected markets. This lists form the sampling frame for the selection of marketers (respondents).The total sampling size was 60 respondents.

2.3 Analytical Techniques

Different analytical tools were used to achieve various objectives. The statistical tools include; Gini-coefficient, marketing efficiency and descriptive statistics analyses. The Objective of the structure of onion marketing was analyzed using Gini-coefficient .This is used to examine the concentration and degree of inequality of the markets or the structure of the market. According to Agbugba *et al*, (2013) Gini- coefficient refers to the number or an index varying between zero and one, zero signifying perfect equality and one, perfect inequality.

Gini - coefficient is given as:

$$G = \frac{d}{2y} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 1$$

$$where:$$

$G = gini\ ratio$

$d = coefficient\ of\ mean\ difference\ of\ sales$

$$d = means\ of\ cost\ of\ sale\ by\ traders/sellers$$

$d = 2[\sum_{i=1}^{k} N^{"}(X_i)(1 - N^{"})][X_{i+1} - X_i]$

$X_i = means\ cash\ sales\ of\ ith\ class\ of\ traders$

$k = number\ of\ classes$

$N^{"}(X_i)A = cummulative\ relative\ frequency\ of\ traders\ of\ the\ ith\ class$

The Objective of determining cost, returns and marketing efficiency of onion marketers was analyzed using the relationship:

$$TC = TVC + TFC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.2$$
$$TR = P \times Q \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3$$
$$NR = TR - TC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4$$

$$where,$$

$TC = Total\ cost\ of\ marketing,$

$TVC = Total\ variable\ cost,\ P = Price\ of\ commodity\ (₦)$

$Q = Quantity, TFC = Total\ fixed\ cost, NR = Net\ return,\ TR = Total\ revenue$

Estimating the efficiency among onion marketers, the Shepherd Futrell model as adopted by Adebayo *et al*, (2006) was used. It is expressed as:

$$Marketing\ efficiency$$
$$= Total\ returns(₦)/Total\ marketing\ cost(₦) \dots\dots\dots\dots\dots\dots\dots 5$$

The ordinary least square regression analysis was employed for the determinants of marketing efficiency. It is expressed implicitly as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 6$$

$$where,$$
$$Y = Marketing\ efficiency\ (as\ expressed\ in\ equation\ 2)$$

$$X_1 = Age\ of\ the\ marketers\ in\ years$$
$$X_2 = Level\ of\ education\ of\ marketers\ in\ years\ of\ schooling$$
$$X_3 = Cost\ of\ transportation\ in\ naira$$
$$X_4 = Level\ of\ patronage\ (volume\ of\ monthly\ sales)$$
$$X_5 = Years\ of\ onion\ marketing\ experience$$
$$X_6 = Amount\ of\ credit\ used\ in\ naira$$
$$X_7 = Household\ size\ (number\ of\ persons\ staying\ under\ the\ same\ roof\ with\ respondent$$

3.0 Results and Discussion
Structure of onion market
The structure of Onion market as computed with Gini coefficient is shown in Table 6

Structure of onion market

Table 6: Computation of Gini coefficient for onion retailers by average monthly sales

Range of Sales(₦)	Freq.	Cum. freq.	Proptn. of cum. Freq. $[N^1(X_i)]$	1- $N^1(X_i)$	Total value of sales (₦)	Mean cash of sales (₦)	$[X_{i+1} - X_i]$	$N^1(X_1)[1 - N^1(X_1)][X_{i+1} - X_i]$
15000-30000	21	21	0.35	0.65	263230	12534.76	9163.42	2084.68
31000-45000	11	32	0.53	0.47	238680	21698.18	779.15	194.09
46000-60000	15	47	0.78	0.22	322160	22477.33	24022.67	4122.29
61000-75000	3	50	0.83	0.17	139500	46500	8166.67	1152.32
76000-90000	3	53	0.88	0.12	164000	54666.67	39333.33	4153.60
91000-105000	2	55	0.92	0.08	188000	94000	6000	441.6
106000-120000	2	57	0.95	0.05	120000	100000	28000	1330
121000-135000	1	58	0.97	0.03	128000	128000	16000	465.6
136000-150000	1	59	0.98	0.02	144000	144000	-144000	-2822.4
151000-165000	0	59	0.98	0.02	0 .00	0 .00	168000	3292.8
166000-180000	1	60	1.00	0.00	168000	168000	0.00	0.00

Gini coefficient (G) = 0.46
Source: Field survey data, 2016

Table 6 showed Gini coefficient as 0.46 implying that the concentration of market sales among onion retailers was low. This was due to a large number of retailers or groups competing with each other. This is an indication that there was no onion retailer exercising control over the market price. This is a typical feature of a competitive market structure, a sign of relative efficiency in the market. In other words, there was also a reflection of low level of income inequality from sales among the retailers. Thus, the market was competitive but not perfectively competitive since the coefficient was not 0 (zero). However, the market tends more to perfect competitive than to monopoly or imperfect market. This is due to the fact that larger number of participants reduces monopoly powers and thus decentralizes the market in terms of patronage and income distribution. Onion retail market typical has more marketers than the wholesale market and many cases more competitive.

Marketing cost and returns

The marketing cost and return is shown in Table 7.

Table 7: Marketing cost and returns analysis

TOTAL RETURNS	Mean Value (₦)	percentage (%)
Average sales volume (bags)	4.26	
Averages selling price (₦)	20500	
Total returns	87330	
TOTAL VARIABLE COST		
Average purchase price (₦)	11000	
Average purchase cost	46860	62.22
Average cost of transportation	7000	9.29
Average cost of loading / offloading (₦)	2400	3.19
Average variable cost (₦)	56260	
TOTAL FIXED COST		
Average cost of rents (₦)	6500	8.63
Depreciation (wages, rents, interests etc)	12000	15.93
Average market charges	550	0.73
Average fixed cost	19050	
Average total cost (TVC + TFC)	75310	100.00
NET RETURNS		
Total returns–Total cost	**12020**	
= (₦87330 – ₦75310)		
MARKETING EFFICIENCY =	**1.20**	

Source: Market survey data, 2016

The result in Table 7 shows that the marketing of onion in Umuahia area was profitable as shown by the positive net returns (Alabi and Adebayo, 2008). The results shows that cost of purchase of onion was higher than other costs incurred and this accounted for 62.22% of the total marketing cost. The second most important cost was depreciation with the cost of 15.93%. The cost of transportation accounted for 9.29% which is in line with the previous work by Obasi and Emenam (2014) who reported a high cost of transportation, the cost of rent accounted for 8.63% after which cost of loading and offloading with 3.19% then cost of market charges with 0.73%. An average net return of ₦12,020 was realized per month. The market was efficient since it has a value greater than 1.This is in line with a study on sun fried meat in Ibadan, which showed efficiency of 1.14 (Okunmadewa *et al*, 2000). The efficiency shows that for every ₦1 cost incurred, a return of ₦1.20 was recorded.

Determinants of marketing efficiency

The determinants of marketing efficiency are shown in Table 8.

Table 8: Regression Result of determinants of marketing Efficiency

Variables	Linear	Double-log+	Semi-log	Exponential
Constant	0.276	8.795	18.222	0.475
	(0.158)	(2.391)**	(1.664)	(0.786)
Age (X_1)	0.008	0.62	0.715	-0.004
	(0.287)	(0.188)	(0.734)	(-0.391)
Level of education (X_2)	0.265	0.817	2.749	0.074
	(3.485)***	(2.721)**	(3.078)***	(2.841)**
Cost of transportation (X_3)	0.000	1.015	-2.217	0.000
	(-1.779)*	(-2.688)**	(-1.972)*	(-2.555)**
Volume of sales (X_4)	0.273	0.667	1.365	0.143
	(2.607)**	(4.491)***	(3.087)***	(3.994)***
Marketing experience (X_5)	0.011	-0.076	0.24	-0.003
	(0.774)	(-0.651)	(0.068)	(-0.247)
Amount of credit used (X_6)	0.005	-0.188	-0.700	-0.006
	(-2.586)**	(-1.979)*	(-2.471)**	(-2.251)**
Household size (X_7)	0.052	0.144	0.482	0.022
	(0.368)	(0.563)	(0.635)	(0.457)
R-squared (R^2)	0.566	0.637	0.575	0.612
F-ratio	0.321	0.406	0.331	0.375
	3.504***	5.068***	3.675***	4.455***
	0.566	0.637	0.575	0.612
	3.504***	5.068***	3.675***	4.455***

Source: market survey data, 2016
* = significant at 10%
***= significant at 1%
**= significant at 5%
+ = lead equation
Figures in parentheses are the T-ratio.

From the four functional forms in Table 8, the Double log was chosen as the lead equation based on the F-ratio, R^2 and conformity to *a priori* expectation. The R^2 was 0.637 showing that about 63.7% variation in the marketing efficiency was accounted for by the variables in the model while about 36.3% was due to error.

The regression result from the lead equation in Table 8 indicates that four variables; cost of transportation, volume of sales, amount of credit level used, level of education were the significant variables that influenced the marketing efficiency of Onion marketing in the study area. From the result, the co-efficient of transportation was found to have a negative but significance relationship with the marketing efficiency at 5% level of significance. This thereby conforms to *a priori* expectation because an increase in transportation is likely to reduce the marketing efficiency of marketers. This results in line with an earlier work by Obasi and Emenam, (2014) in marketing performance on Onions in Ikwuano and Umuahia L.G.A of Abia State, Nigeria, which showed that transportation contributed much to the marketing cost paid by the respondents.

Level of education was found to be positive and significant which implies that an increase in education increased marketing efficiency by 0.817% and these confirms to a prior expectation.

This implies that as education of a marketer improves, his efficiency also increases. The coefficient of volume of sales showed an expected positive relationship with marketing efficiency at 1% level of significance. This implies that as the volume of sales increased, the marketing efficiency of the marketers also increased. The amount of credit used was also positive and significant at 10% which means that the amount of credit used would lead to a higher amount of marketing efficiency of the onion marketers. This conforms to *a priori* expectation and with agrees with the findings of Obasi and Emenam, (2014)

Problems of Onion marketing
The problems of Onion marketing is shown in Table 9.

Table 9: Problems of Onion marketing

Problem encountered	*Frequency	Percentage (%)
High cost of Transportation	51	85
Insufficient capital	52	87
Inadequate and unreliable market	32	53
Weather condition	48	80
Competition	46	77
Low demand	38	57
Insufficient	38	63
Spoilage	56	93

Source: Market survey data, 2016
*multiple responses recorded.

The result in Table 9 shows that the major problem encountered by the marketers was spoilage with the highest percentage of 93%. This is due to lack of storage facilities and distance. Since most of the Onion crops produced is from the North and transportation to the east, transportation becomes a problem coupled with the relative short shelf life of the commodity. About 85% of the respondents complained of high cost of transportation which makes it difficult to get the crops from the north down to the east, 87% of the respondents complained of insufficient capital for buying their Onion so as to make more profit and expand the market size. Some other 77% noted that unhealthy competition was a problem. About 80% noted that weather condition was a major problem, especially during the raining seasons if the produce are not properly bagged and kept well leading to spoilage thereby reducing profits.

4. Conclusion and Recommendations
The study shows that market structure of onion in Umuahia area of Abia state was relatively competitive which means that there were many buyers and sellers in the market in which neither the buyer nor the sellers can easily influence prices instead prices in the market were influenced by the forces of demand and supply. Also, onion marketing was relatively efficient and profitable since the respondents within the study area made some profits; the business can also help in generating employment and alleviating poverty.
The study reveals that high cost of transportation as a result of the distance involved in bringing onions from the north to the east was of the major problem faced by marketers; thereby governments should build warehouses within the eastern part of Nigeria so that marketers can purchase their goods there at cheaper prices and also to reduce physical risks. Government should also provide storage facilities to traders and farmers so as to solve the problem of

scarcity of product during the off season. The structure of the markets shows that the market was competitive though not perfectly competitive. These shows that no person or group of persons can influence the market and the prices of onions are influenced by forces of demand and supply. Structural reforms that can improve marketers' access to loans and credit are recommended so as to induce higher rate of competition for sales in the market. The significant variables that influenced marketing efficiency should be considered in policy issues concerning the commodity or related commodities in order to improve the marketing efficiency.

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