ANALYSIS OF MARKETING EFFICIENCY OF TOMATO FRUITS IN ABUJA MUNICIPAL AREA COUNCIL, NIGERIA

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ABSTRACT
The study examined the marketing efficiency of tomato fruits in Abuja Municipal Area Council, Nigeria. The market structure analysis with gini-coefficient of 0.7152 implied that, there was a high degree of inequality and high level of concentration within the markets. Analysis of income distribution among the marketers with gini-index of 0.4 revealed that there was less inequality in the income of the marketers. The market conduct results indicated that there was no fixed/regulatory pricing by the government or any marketing cooperative for tomato product. Rather, prices were determined mostly by price bargaining power (17.8%), forces of demand and supply (34.7%) and Marketing cost and margin (40.5%). Market performance analysis involved the estimation of the marketing margin and costs and returns analysis. The gross marketing margin of wholesalers was ₦66. 27/kg while that of the retailer was ₦68.14/kg. Costs and returns analysis with gross ratios of 0.31 and 0.62 for the wholesalers and retailers showed that tomato fruit marketing was a profitable business venture in the area. Marketing efficiency estimation for wholesalers and retailers indicated a low level of efficiency though wholesaler was more efficient than retailers. Based on the findings, it is therefore recommended that premium motor spirit should be made available to the road transport workers at lower rate to reduce transportation cost due the long queues at filling stations and patronage of black marketers.

INTRODUCTION

Tomato (*Lycopersicon esculentum*), an annual and highly perishable crop, is globally one of the most important vegetables due to its economic and nutritional benefits [1]. According to Ogunniyi and Oladejo [2], tomato is considered a high yielding fruit vegetable in many parts of Nigeria. It is highly nutritious (rich in vitamins and minerals) vegetable used in the preparation of many delicacies and, a source of livelihood for its producers and marketers. The average daily consumption of tomato is 18% of vegetables consumed in the country, hence, its importance in the diet of an average Nigerian [1]. Marketing involves the performance of all micro and macroeconomic activities which direct the forward flow of goods and services to consumers in order to accomplish the producer's objective. Marketing efficiency however involves all those legal, physical and economic services which are necessary to make products from the farm available to the consumers in the form and amount desired, at the place and time desired and, at the price consumers and middlemen are willing to pay to take possession of the product. It describes the process of planning and executing the conception, pricing, promotion and distribution of ideas, products and services to create exchange that will satisfy the needs of individuals and organization [3]. However, tomato marketing is plagued with serious challenges ranging from price variations due to seasonality, to high rate of perishability and post-harvest losses, lack of standard weights and

measurement, inadequate road infrastructure, inaccessibility to credit facilities by the marketers, low farm gate price and insufficient marketing information, inadequate storage and processing facilities and, long distances from the point of production to the point of sale [1, 4, 5]. All these challenges tend to increase the marketing cost, reduce the expected yield and hence reduce its marketing efficiency. Evaluation of the marketing efficiency of tomato is therefore crucial in improving its production and marketing activities [3]. This is because an efficient tomato marketing system will ensure that its supply, though seasonal and highly perishable, is available all year round with little variation in prices. It is against this backdrop that this research paper is aimed at identifying the marketing channels of tomato in the study area; determine its marketing structure, conduct and performance and determine the marketing efficiency of the marketers in the area.

Conceptual framework
According to Olukosi and Isitor [7], efficiency in the agricultural industry can be defined as the maximization of the ratio of output to input in marketing. Marketing efficiency is therefore defined as the movement of goods from producers to consumers at the lowest cost consistent with the provision of the service that consumers desire and are able to pay for. The efficiency of a market can be evaluated (one approach) through analyzing the existing channels according to price and service provided. The prevailing price should reflect cost plus a profit margin and the profit must be just sufficient

to reward investment at the going rate of interest rate. It is widely used in the measurement of market performance.

Marketing inputs include the resources used in providing marketing services such as labour, packaging, machinery, finance, etc. On the other hand, marketing output includes time, form, place and possession utilities which the consumer derives from the marketing of the product. Thus, marketing inputs are the costs of providing marketing services whereas marketing output are the benefits or satisfaction created or the value added to the commodity as it passes through the marketing system [7]. It is easier to estimate the input cost of marketing than the output of marketing. While the input cost of marketing is simply the sum of all the prices of resources used in the marketing process, the best measure of marketing output (consumer's satisfaction) is the price consumers are willing to pay in the market for farm products with different levels of marketing utilities [7]. The higher the efficiency ratio, the higher the marketing efficiency and any change in the marketing process which reduces the input cost of accomplishing a particular marketing service without reducing the consumer satisfaction is certainly an improvement in marketing.

In line with Shepherd-Futrel model, marketing efficiency is sometimes calculated as net margin divided by marketing cost and the result multiplied by one hundred [8, 9]. In the alternative, the coefficient of marketing efficiency can be expressed as the difference between total sales revenue and total cost divided by total cost incurred [10]. If marketing efficiency is to be exactly 100%, net margin must be equal to marketing costs. Marketing efficiency of 100% is perfectly efficient which is usually rare to attain. This challenge in a way creates room for improvement of the marketing system at different levels of operation. Marketing efficiency of a marketing system is enhanced when marketing costs are reduced at the same level of output [11]. Marketing costs are incurred when commodities move from the point of production to the final market, whether they are moved by farmers or marketing intermediaries. As the product is moved over greater distances, through more intermediaries and given better packaging, marketing cost increases. Marketing costs include labour, transport, packaging, containers, rent, utilities, advertising, selling expenses, depreciation allowances and interest charges [12]. In a perfectly competitive market, the marketers will strive to minimize marketing costs in an attempt to maximize their profits. As they minimize costs, parts of the gains of cost minimization are passed on to the consumers in terms of reduced prices. Firms with lower marketing costs are hence deemed to be more efficient. This has led to the concept of relative efficiency in which the unit cost of each firm in the sector is compared with the unit cost of the most efficient firm (the least cost firm) [11, 13].

MATERIALS AND METHODS
Study area
The study was conducted in Abuja Municipal Area Council (AMAC). Abuja is the Federal Capital Territory (FCT) of Nigeria. It has inter-state boundaries with Nasarawa State to the east and southeast, Niger State to the northwest, Kaduna State to the northeast and Kogi State to the southwest [14]. It covers an area of 7,753.9 Km^2 and lies between latitude 09˚05'C North and longitude 07˚32' East. FCT had a population of 1,406,239 persons [15], which was projected to 3,324,000 in 2016 at 2.5% growth rate [16, 17]. It has a population density of 192 people per square kilometre. FCT falls within the Guinean forest-savannah mosaic zone and features a tropical wet and dry climate. The FCT experiences three weather conditions annually. These include a warm, humid rainy season and a blistering dry season. In between the two, there is a brief interlude of harmattan occasioned by the northeast trade wind, with the main feature of dust haze and dryness. The rainy season begins from March to November every year [14]. It is administered through six area councils, which include Bwari, Kwali, Gwagwalada, Abaji, Kuje and AMAC [14]. Most people in the study area engage in farming at all level while few of them engage in white collar jobs. The major crops grown include millet, corn, sorghum, rice, yams, cassava, plantains, groundnuts, cowpeas and tomatoes and pepper while commercial rearing livestock such as cattle, sheep, and goats also occurs.

Sampling size and sampling technique
Multistage sampling technique was used to select the respondents in the area. The first stage involved a purposive selection of Abuja Municipal Area Council (AMAC) because the area is known for tomato marketing. The second stage involved a random selection of Dei-Dei and Gwagwa tomato markets. In the third stage, the marketers were categorized into wholesalers and retailers, respectively. Using the formula developed by Yamane [18] to calculate sample size.

$$n = \frac{N}{1+N(e)^2} \text{...(1)}$$

Where,
n = sample size
N = finite population
e = limit of tolerable error (level of significance = 0.05)
1 = constant
A summary of the selection procedure was as presented in Table 1

Data collection
Primary data were collected through the use of well-structured interview schedule to elicit relevant information from the tomato marketers.

Analytical techniques
To achieve the stated objectives, the following analytical techniques were employed for the study.

Market structure analysis

Market structure is basically a measure of the degree of competition in a particular market [19]. The Gini coefficient and Lorenz curve were used to examine the market structure of tomato marketing in the area. The Lorenz curve is a graphical representation of the cumulative income distribution of the marketers. It shows the percentage of the total income that was accrued to the marketers. The straight line represents perfect equality but any departure from this 45° line represents inequality and the larger that 'deficit", the

Table 1: Selection procedure of the sampled markets in the study area

Selected LGA	Markets	Total sampling frame(N)		Total sample size (n)	
		Wholesalers	Retailers	Wholesalers	Retailers
AMAC	Dei-dei	27	50	25	44
	Gwagwa	10	25	9	23
TOTAL		37	75	34	67

Authors' computation, 2015

larger the inequality of income and vice versa. According to Ojo [19], it gives indications about competitiveness of the tomato markets. Mathematically, the Gini coefficient as used by Iheanacho [20] and Ojo [19] is expressed as follows:

$$GC = 1 - \sum XY \qquad ……(2)$$

where:
GC = Gini coefficient
X = proportion of sellers
Y = cumulative proportion of sales
Σ = summation sign

The Gini coefficient varies from 0 to 1, where 0 implies perfect equality in the distribution (perfect market) while 1 imply perfect inequality (imperfect market). The closer the Gini-coefficient is to zero, the greater the degree of equality, the lower the level of concentration and the more competitive are the markets. Similarly, as the Gini coefficient approaches unity, the greater is the degree of inequality, the higher the level of concentration, the more imperfect the markets are, and consequently, the lower the efficiency of such markets [19].

Gini coefficient can also be used to determine income distribution of the marketers with the aid of Lorenz curve. When the Gini Coefficient is close to 1, the income distribution is more uneven (unequal) because most income is earned by the richest marketer, whereas the lowest-income group earns much less. When the Gini Coefficient is close to 0, the income distribution is more even (equal) because the highest-income marketer does not earn much more than the lowest-income marketer. When the gini index expands, the Gini Coefficient will be nearer to 1; and the income distribution will be more unequal but when it diminishes, the gini coefficient will be nearer to 0 and the income distribution will be more equal. When the Lorenz Curve is closer to the line of equality, the gini coefficient is smaller and closes to zero, representing a smaller income inequality [21].

Market conduct analysis
Market conduct in the study area was analyzed using pricing behavior analysis as proposed by Scott, 1995 [22] and used by Astewel [23] and Ojo [19]. This involves the determination of who set prices (e.g. market forces of demand and supply, market negotiation (higgle and haggle) and marketing cost and margin.

Market performance analysis
Marketing margin analysis and profitability ratios was used to analyze the performance of tomato markets in the study area as stated below:

Marketing margin analysis
The cost and price information was used to construct marketing costs and margins. Barau *et al.* [24] and Anuebunwa [25] determined the marketers' gross marketing margin as the difference between cost price and the selling price.
This is expressed as follows:
$$D = C - A \qquad ……(3)$$
Where,
D= Traders' gross marketing margin (₦)
C = Traders' Gross Income (₦)
A = Cost of purchase of rice (₦)
The marketers' share was then derived as the difference between the selling price (Gross earnings) of rice and the marketers' gross marketing margin. This is expressed as percentage of selling price viz:

$$Marketers'\,share = \frac{C - D}{C} \times 100 \qquad ……..(4)$$

D= Traders gross marketing margin
C = Traders' Gross Income (₦)
Marketing margins may fluctuate depending on perishability of products, the number of level of participants in the marketing channel, The marketing services provided and risk and uncertainty borne by each of the market participants. The value of marketing margin obtained would indicate the percentage share that the producer received from the consumer.

Profitability (net margin) analysis
The net margin is the net earnings, which a seller earns after paying all marketing costs. Net earnings of various tomato marketing agencies will be computed with the following formula:
Gross Margin (GM) = GI – TVC … (5)
Net Profit (NP) = GM – TFC … (6)
Where,

GM = Gross Margin,
GI = Gross Income,
TVC = Total Variable Cost.
NP = Net Profit,

Gross ratio

This is the total cost of production divided by the gross income. A less than 1 ratio is desirable for any farm business. The lower the ratio the higher the return per naira invested.

Operating ratio

This is the total variable cost divided by gross income. It shows the proportion of the gross income that is used to pay for the operating costs. Therefore, the lower the ratio the higher the returns on investment.

A market that is efficient does not only bring sellers and buyers together, it enables entrepreneurs to take advantage of opportunities, to innovate and improve in response to demand and price change [6]. Marketing efficiency was calculated following the work of Emam [6] and is expressed as:

$$ME = \frac{VAM}{CMA} X100 \ \ldots\ldots\ldots(7)$$

Where,
ME = Marketing efficiency
VAM = Value added by marketing
CMA = Cost of marketing services

Value added by marketing = Price received by trader less price received by preceding trader = Selling Price – Cost Price……………(8)

RESULTS AND DISCUSSION

Analysis of market structure of tomato marketers

The gini-coefficient as presented in Table 2 was 0.7152. This result implied that tomato marketing in the area was dominated by a few people. It can be deduced that it was an imperfect market and that, there was a high degree of inequality and high level of concentration within the markets. Hence, the markets were likely to be inefficient. This corroborates the work of Mcconnell and Brue [26] who reported that higher market concentration signifies that a market is monopolistic in nature with few individuals controlling the market.

Table 2: Computation of Gini-coefficient for tomato marketers in the study area

IS (₦)	NS	PSL (X)	CPSL	TS(₦)	PS	CPS (Y)	∑XY
≤ 50,000	52	0.51	0.51	1349700	0.10	0.10	0.051
50001-100000	10	0.10	0.61	690500	0.05	0.15	0.015
100001-150000	07	0.07	0.68	805000	0.06	0.21	0.015
150001-200000	06	0.06	0.74	1145000	0.09	0.30	0.018
200001-250000	07	0.07	0.81	1680000	0.13	0.43	0.030
250001-300000	10	0.10	0.91	2920000	0.23	0.66	0.066
> 300000	09	0.09	1.00	4345000	0.34	1.00	0.090
Total	**101**	**1.00**		**12935200**	**1.00**		**0.2848**

Source: Authors Computation, 2015   GC = 1- ∑XY = 1-2848 = 0.7152
IS = Income Sale; NSL = No of Sellers; CPSL = Cummulative Proportion of Sellers; TS = Total Sales; PS = Proportion of Sales; CPS = Cummulative Proportion of Sales

Analysis of income distribution among the marketers

From the Figure, the value of gini-index was 0.4 which revealed that income distribution was closer to 0 than 1. Hence, there was less inequality in the income of the marketers. It is also an indication that richest among them did not have the power over the gross income that is, the highest-income marketer may not likely earn much more than the lowest-income marketer.

Figure 1: Lorenz Curve

Analysis of market conduct of tomato product

This involves the determination of who set prices (e.g. market forces of demand and supply, the competitors, market negotiation (higgle and haggle) and marketing cost and margin). The findings in Table 3 revealed that there was no fixed/regulatory pricing by the government or any marketing cooperative for tomato product. Rather, prices were determined mostly by price bargaining power (17.8%), forces of demand and supply (34.7%) and Marketing cost and margin (40.5%). However, 4% of the marketers depended on other forms of pricing behaviour in fixing tomato fruit prices. Since marketing cost and margin ranked first, the results of this analysis implied that though there were different pricing behaviour options available to the marketers, most marketers (irrespective of the conditions prevailing in the market) will first determine the financial (cost) implication of choosing a particular pricing behaviour option because no marketer would wish to run at a loss in order to stay long in the business.
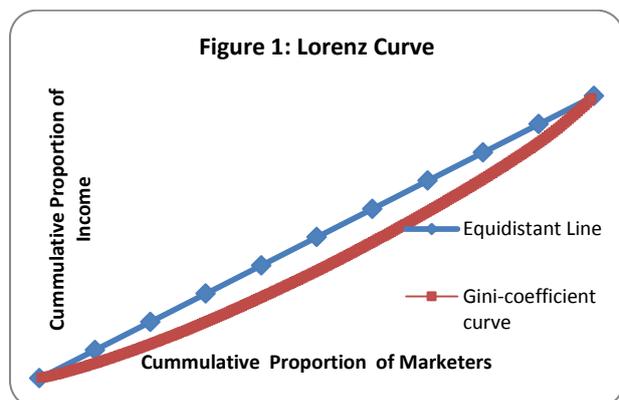
Market performance analysis of tomato marketing in the study area
Marketing margin analysis and profitability ratios was used to analyze the performance of tomato marketers in the study area.

Marketing margin analysis
Marketing margin shows the fraction of the consumer's expenditure on a commodity that is received by the producer or the marketing agents. As revealed in Table 4, the gross marketing margin of wholesalers was ₦66.27/kg while that of the retailer was ₦68.14/kg. The difference between the gross marketing margin of the wholesalers and the retailers in the study area was estimated at ₦1.87/kg. This revealed that wholesalers were more efficient than retailers in the discharge of their marketing activities. The percentage gross marketing margin for wholesalers and retailers were 77.88 and 59.65, respectively. This means that, for every ₦100 paid by the consumers for the purchase of tomato fruits, ₦77.88 and ₦59.65 covered marketing costs and profits, respectively. The marketer' share for wholesalers and retailers were 22.12 and 40.35 per kilogramme, respectively.

Table 3: Tomato marketing conduct analysis in the study area

Form of pricing	Frequency	Percentage (%)
Price set by competitors	3	3.0
Market association directive	4	4.0
Price bargaining (Higgle & haggle)	18	17.8
Forces of demand and supply	35	34.7
Marketing cost and margin	41	40.5
TOTAL	101	100.0

Source: Authors Computation, 2015

Costs and returns analysis
The costs and returns analysis of the marketers (Table 5) revealed that the wholesalers and retailers' total variable cost were ₦21.40/kg/marketer and ₦47.14/kg/marketer, respectively. Purchase cost had the highest percentage of 46.38 and 69.17 for both the wholesalers and retailers, respectively. The percentage of total cost on transportation for wholesalers (19.64%) was higher than that of retailers which was only 0.65%. The reason for this was not far-fetched as retailers were closer to the final consumers than wholesalers who had to travel inter-states (i.e. long distances) to purchase their tomato fruits despite the high cost of premium motor spirit (Petrol) which has generated a lot of long queues at filling stations in the different parts of the country. In addition, the wide margin also implied that wholesalers usually purchase large quantities of basket of tomato fruits and hence higher transportation cost whereas retailers, often times, purchase less than five baskets at a particular time hence spent less on transportation. The least variable cost for each of the categories of marketers was handling cost of ₦0.12/kg/marketer (wholesalers) and 0.07/kg/marketer (retailers). The total cost of wholesalers (₦26.58/kg/marketer) when compared with that of retailers (₦71.09/kg/marketer) was low because they enjoyed economy of scale and were better informed about the market trend. The net farm income for both categories of marketers showed that marketing of tomato fruits was profitable in the area. The gross ratios of 0.31 and 0.62 for the wholesalers and retailers showed that for every ₦1 gross returns (revenue), 31k and 62k were spent on marketing cost, respectively. Therefore, tomato fruit marketing is a desirable business venture for all and sundry. The operating ratios of 0.25 and 0.41 were an indication that for every ₦1 accrued as gross returns, 25k and 41k were expended as variable costs by wholesalers and retailers, respectively. This result is similar to that of Mohammed and Adamu [27] who conducted a study on the marketing of fresh and dried tomato in Kano Metropolis using budgetary techniques and index of marketing efficiency. The findings revealed that tomato marketing was profitable with net revenue of ₦44.05/kg for fresh tomato and ₦55.40/kg of dried tomato, respectively. The results further indicated that tomato marketing for both dried and fresh tomato was profitable in the area. Haruna *et al.* [28] analyzed the profitability of fresh tomato marketing using the gross margin analysis. Results revealed that tomato marketing was profitable with gross ratio of 0.86 and a net income per tonne of ₦11, 330.

Marketing efficiency analysis
Marketing efficiency: Table 6 showed that tomato fruits marketing had low marketing efficiency level for both categories of marketers though wholesalers had higher marketing efficiency (24.87) than retailers (10.07) in the study area. This result deferred from the findings of Emam [6] on evaluating marketing efficiency of tomato in Khartoum State, Sudan who reported that retailers had higher marketing efficiency than wholesalers. However, it is in agreement with that of Taye *et al.* [29] in a research on marketing performance and efficiency of evaporative preservation cooling system for fresh tomato marketing in Ondo State, Nigeria. It was reported that fresh tomato marketing was efficient with average marketing efficiency of 17.65%.

Table 4: Marketing margin analysis of tomato fruits marketing

Variables	Wholesalers	Retailers
Gross earnings from sales (₦/kg)	85.09	114.23
Purchase cost (₦/kg)	18.82	46.09
Gross marketing margin (₦/kg)	66.27	68.14
Percentage gross marketing margin (%)	77.88	59.65
Marketers' share of Gross marketing margin (%)	22.12	40.35

Source: Authors Computation, 2015

Table 5: Costs and returns analysis of tomato fruits marketing

Items	Wholesalers		Retailers	
	Amount (₦)/kg⁄seller	% of TC	Amount (₦)/kg⁄ seller	% of TC
Variable Cost				
Cost of tomato	18.82	46.38	46.09	69.17
Damage cost	0.22	3.01	0.18	0.22
Transportation cost	1.97	19.64	0.53	0.65
Loading & offloading cost	0.27	0.67	0.27	0.33
Handling cost	0.12	0.29	0.07	0.08
Total Variable Cost	21.40	69.99	47.14	70.45
Fixed Cost				
Security	1.21	5.45	1.14	1.41
Taxes	0.06	0.15	1.45	1.79
(Depreciation on baskets, canopy and bowls)	1.97	4.85	0.96	1.18
Rent	1.94	19.57	20.4	25.16
Total fixed cost	5.18	30.02	23.95	29.54
Total cost (TC)	26.58	100	71.09	100
Returns (TR)	85.09		114.23	
Gross margin	63.69		67.09	
Net farm income (Profit)	58.51		43.14	
Gross ratio (TC/TR)	0.31		0.62	
Operating ratio (TVC/TR)	0.25		0.41	
Profitability ratio(Profit/TC)	2.20		0.61	

Source: Authors Computation, 2015

Table 6: Marketing efficiency level of tomato marketers

Market participants	Marketing cost (₦/kg)	Selling price (₦/kg)	Cost price (₦/kg)	Marketing Efficiency (%)
Wholesaler	26.58	25.43	18.82	24.87
Retailers	71.09	53.25	46.09	10.07

Source: Market survey (2015)

CONCLUSION AND RECOMMENDATIONS

The study examined the marketing efficiency of tomato fruits in Abuja Municipal Area Council, Nigeria. The market structure analysis with gini-coefficient of 0.7152 implied that, there was a high degree of inequality and high level of concentration within the markets.

Analysis of income distribution among the marketers revealed that the gini-index of 0.4 revealed that income distribution was closer to 0 than 1. Hence, there was less inequality in the income of the marketers. The market conduct results revealed that there was no fixed/regulatory pricing by the government or any marketing cooperative for tomato product. Rather, prices were determined mostly by price bargaining power (17.8%), forces of demand and supply (34.7%) and Marketing cost and margin (40.5%). Market performance analysis involved the estimation of the marketing margin and costs and returns analysis. The marketing margin show that gross marketing margin of wholesalers was ₦66. 27/kg while that of the retailer was ₦68.14/kg. Costs and returns analysis with gross ratios of 0.31 and 0.62 for the wholesalers and retailers showed that tomato fruit marketing was a profitable business venture in the area. Marketing efficiency estimation for wholesalers and retailers indicated a low level of efficiency though wholesaler was more efficient than retailers. Based on the findings, the following recommendations were made:

1. Premium motor spirit should be made available to the road transport workers at lower rate to reduce transportation cost due the long queues at filling stations and patronage of black marketers.

2. More market outlets should be established by the Local Government Area Councils to reduce inequality within the markets.
3. To improve the marketing efficiency of different categories of marketers, there should be an improvement in the dissemination of marketing information to them.

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