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Evaluation of the Structure, Conduct and Performance Paradigm of Fresh Tomato Marketing in Ondo State, Nigeria

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Abstract: Efficient tomato marketing depends on how the market is organised in terms of interrelationship between buyers and sellers. This study investigated the structure, conduct and performance of fresh tomato marketing. Specifically, the study examined the structure and conduct of tomato, examined its performance and determined the factors influencing fresh tomato marketing in the study area. The data collected from 160 tomato marketers through the use of structured questionnaire were analysed using descriptive statistics, Gini coefficient, budgetary technique and regression analysis (OLS). Results of Gini coefficient revealed a high inequality in distribution of sales. Price of tomato fruits varied widely because there were no price tags and proper standardization. Despite the intrinsic characteristics of fresh tomato fruits, its sale was profitable judging by the Gross margin and Benefit cost ratio (BCR). Cost of purchase, marketing experience, labour cost, transport cost, price/kg and storage cost were the major determinants of fresh tomato marketing in Ekiti State. Subsidizing the cost of purchase and transportation will go a long way in reducing the marketing cost and consequently increasing the gross margin per marketer.
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1.0 Introduction

Tomato is an edible fruit known for its short duration and grown in both tropical and subtropical regions. Tomato can be eaten raw, cooked or made into puree. It is one of the most important vegetables worldwide (Adepoju, 2014). The average daily consumption of tomato is about 18% of all vegetables (Babalola et al, 2010). Nigerian small farmers grow tomato due to the high demand as well as the favourable climatic conditions.

Tomato marketing is an important aspect of agribusiness because it is a source of employment, makes tomato available all the year round, makes tomato available in all parts of the country through transportation and distribution, reduces perishability through processing and storage and serves as a source of employment particularly for women farmers and sellers. Though tomato has nutritional values and health benefits, its marketing is problematic due to its intrinsic characteristics such as perishability, bulkiness, bright colour and high moisture content which makes it susceptible to pests and diseases. Consequently, tomato marketing is susceptible to pre-harvest and post- harvest loses implying a measurable decrease in quantity and quality of the fruits and consequent reduction in market supply (Argawal (2017). The post-harvest losses include changes in physical characteristics such as colour and firmness, change in taste and smell leading to decrease in volume or weight all of which decrease the market value.

In addition, its marketing is plagued with serious challenges ranging from price variations, due to seasonality, lack of standard weights and measurements, inadequate road infrastructure dependence on rain which is very unpredictable, inaccessibility to credit facilities by the marketers, low farm gate price and long distances from the point of production to the market (Ayandyi and Adeniyi, 2011, Achoja and Okoh, 2013). All these challenges seem to decrease the expected yield and reduce its marketing efficiency. From the backdrop of the importance of tomato marketing and its bedevilling problems, this study wants to evaluate the structure, conduct and performance of fresh tomato marketing in Ondo State.

The success of tomato marketing and its efficiency depends on how the market is organized in terms of inter relationship between buyers and sellers. This relationship involves competition between many buyers and sellers, influences information and pricing system operating in the market. Market structure is the

prevailing nature of competition in a market characterized by many buyers and sellers, their distribution and the degree of product differentiation. The bane of agricultural produce is in most developing countries is to minimize pre-harvest and post-harvest losses through effective market structure.

The level of efficiency and profitability of the market and marketing functions are very important for sustainable marketing of agricultural produce like tomato. An efficient marketing system ensures that goods which are seasonal will be available all the year around, with a little variation in prices which can be attributed to cost of marketing functions (Nwaru, Nwosu and Agummo, 2011). The availability of tomato to consumers at the right time and place requires an effective marketing system, the structure, conduct and performance are very important. Market structure includes the degree of buyers and sellers' concentration defined by the number of buyer and sellers, market transparency which includes the availability of relevant market information, its distribution among buyers and sellers, the condition of entry to the marketi.e the ease or difficulty with which sellers may enter the market.

Market conduct on the other hand refers to market co-ordination mechanism and pricing policies used by actors in the chain (Anrooy, 2003). It is also the way buyers and sellers behave both amongst themselves and among each other. It is an integral component of structure-performance framework and entails the analysis of those factors that determine competition within an industry. Market Performance on the other hand is a reflection of structure and conduct on product price, costs and the volume and quality of output. According to Awol (2010), Market Performance involves the assessment of how well the process of marketing is carried out i.e how successfully its aims are accomplished. Is its quality reliable, consumption of the products increasing or are sales expanding in competitive markets.

As a method for analysis, the Structure, Conduct and Performance (SCP) paradigm postulates that a relationship exists between the three levels that must be distinguished through proper investigation. This further informs this study.

A number of studies have been carried out on profitability, conduct, structure and performance of tomato marketing and other agricultural products both at national and international planes. For instance Abdal and Eglal (2010), investigated the economics of fish marketing in Khartoum State of Sudan. Emain (2011) evaluated marketing efficiency of tomato in Khatoum State, Sudan. Bongiwe and Masuku (2012) determined the factors affecting the choice of marketing channels by Vegetable Farmers in Swaziland. Bukenya, Theodora, Twinamasiko and Mohar (2012) analysed the economics of fish marketing in Uganda with emphasis on profitability and performance. Nwosu and Agommuo, (2011) studied the socio-economic determinants of profit in wholesale and retail banana marketing in Umuahia agricultural zone of Abia State, Nigeria. Haruna, Sani, Danwanka and Adejo (2012) worked on the economic analysis of fresh tomato marketers in Bauchi State. Shehu and Mohammed (2017) analysed the economics of tomato marketing in Ilorin Metropolis with emphasis on marketing functions and structure. Sekumade and Toluwase (2014) investigated the profitability and production efficiency of indigenous tomato cultivation in Osun State, Nigeria. Obayelu, Arowolo, Ibrahim and Croffie (2014) investigated the economics of fresh tomato marketing in Kosofe Local Government Area of Lagos State with specific attention on profitability and market margin analysis.

While drawing from the experiences of these authors, efforts will be made to investigate the efficiency of tomato marketing in addition to conduct, structure and market performance.

2.0 Methodology

2.1 Study Area

The Study was carried out in Ondo State southwestern Nigeria. It shares boundary with Ekiti, Kogi and Kwara in the north, Edo and Delta in the east, Oyo, Ogun and Osun States in the west. It has a tropical climate characterized by heavy rainfall in the south which breaks down to derived savannah in the North. Tomato and other arable crops are grown in all parts of the state except the riverine areas where fishing is the major occupation. Tree crops like oil palm, cocoa, etc are grown in the tropical rainforest areas.

2.2 Sampling Technique and Data Collection

A multistage sampling technique was used in sample selection. This involves purposive selection of four Local Government Areas, random selection of 4 communities and 10 marketers from each market making a total of 160 tomato marketers in all. Primary data were collected from the selected tomato marketers through the use of structured questionnaire administered on the 160 tomato marketers. Data were collected on the socio-economic characteristics of the respondents, cost and returns, market channels, quantity of tomato bought and sold, price per basket, marketing costs, etc.

2.3 Data Analysis

Descriptive Statistics such as mean, mode, frequency tables were used to analyse the socio-economic characteristics of the respondents.

2.3.1 Gini coefficient

This refers to a number or an index varying between zero and one. Zero signifies perfect equality

and one, perfect inequality. It was used to analyse the market structure of tomato marketing in the study area. Gini coefficient (GC) is obtained by the formula.

$$GC = 1 - \sum XY \quad (1)$$

where:
GC = Gini coefficient

X = Proportion of tomato sellers, $X = \frac{No\ of\ tomato\ sellers\ in\ the\ market}{Overall\ no\ of\ tomato\ sellers\ understudy}$ (2)

Y=Proportion of total sales of tomato, $Y = \frac{Total\ sales\ of\ tomato\ in\ a\ market}{Overall\ total\ sales\ of\ tomato\ in\ all\ the\ markets\ understudy}$ (3)

$\sum$ =Summation sign

Abah et al. (2015) posited that GC greater than 0.35 indicates inequitable distribution of sales income. Girei et al. (2015) submitted that the closer the Gini coefficient is to zero, the greater the degree of equality. Conversely, the lower the level of concentration, the more competitive is the markets. Also as GC approaches unity, the greater is the degree of inequality, the higher the concentration the more and the imperfect the markets and consequently the lower efficiency of such markets (Ojo 2014).

2.3.2 Budgetary Techniques

Analysis of costs and returns was used to determine the profitability of tomato marketing in the study area.

Gross Margin

This is explicitly expressed as:

$GM = \sum (P_{ij}Q_{ij} - r_{ij}X_{ij})$ (4)

P_{ij} = Price of tomato in i^{th} for jth respondent

Q_{ij} = Quantity of tomato in i^{th} for jth respondent

r_{ij} = Price of variable input in i^{th} for j^{th} respondent

X_{ij} = Quantity of variable input in i^{th} for j^{th} respondent

2.3.3 Profitability Ratio

The profitability ratio was calculated as follows:

$PR = \frac{\pi}{TVC}$ (5)

Where: PR = Profitability Ratio

TVC = Total Variable Cost

TC = FC + VC

Where: TC = Total Cost

FC = Fixed Cost

VC = Variable Cost

NFI = GM - FC (6)

Where: NFI = Net Farm Income

GM = Gross Margin

Benefit Cost Ratio (BCR) = $\frac{TR}{TC}$ (7)

Where: TR = Total Revenue

BCR = Benefit cost ratio

As a rule of thumb, when the BCR is greater than 1 (>1) it indicates profit, when less than 1 (BCR<1) it indicates loss and when equal to 1 (BCR =1) it is break even.

RRI = $\frac{\pi}{TC}$. (8)

Where

RRI = Rate of Return on Investment

TC = Total Cost

π = GM – TFC (9)

Efficiency Ratio is given as $\frac{TR}{TVC}$

If $\frac{TR}{TVC} > 0$ it is operational efficiency

$\frac{TR}{TVC} < 0$ it is operational inefficiency

2.3.4 Multiple Regression Model

The marketing function postulated for the annual income from the sale of fresh tomato is presented in equation 10. It was used to determine the annual income from the sale of fresh tomato in Ekiti State. The implicit equation is given as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, U_i)$ (10)

Y = Annual Income from fresh tomato marketing (N)

X_1 = Age of respondents (Years)

X_2 = Cost of purchase (₦)

X_3 = Tomato Marketing experience (Years)

X_4 = Labour cost (₦)

X_5 = Transport cost (₦)

X_6 = Price/basket/kg

X_7 = Tomato storage cost (₦)

X_8 = No of years spent in school

X_9 = Distance to the market (km)

U_i = Error term assumed to fulfil all assumptions of the classical linear regression model.

The functional forms namely; linear, double log, semi- log and exponential were tried and the best fitted was selected based on the econometric criteria as proposed by Kousoyianis (1977).

3.0 Results and Discussion

3.1 Socio-economic characteristics of the respondents

Both sexes were involved in fresh tomato marketing although females were more prominent. Majority (71.3 %) of them were females while only 28.7 % were males. This holds a contrary view to the findings of Haruna et al. (2012) who found out that majority of males engage in fresh tomato marketing in Bauchi State (Table 1). The respondents were young with 54.4% of them 40 years and below indicating that they are in their active ages. A large proportion of them (76.9%) had formal education and they were

well experienced in fresh tomato marketing with 68.1% having more than 11 years of tomato marketing experience. About 79% of them had 5 and more household members. Investigations revealed that the household members particularly the young ones were used as labour in the sale of tomato.

Table 1: Socio-economic characteristics of the respondents

Variable	Frequency	Percentage
Sex		
Female	114	71.2
Male	46	28.8
Age		
<21	05	3.1
21-40	82	51.30
41-50	36	22.5
51-60	25	15.6
>60	12	7.5
Marital status		
Single	22	13.8
Married	115	71.9
Divorced	12	7.5
Widowed	11	6.9
Religion		
Christianity	88	55.0
Islamic	67	41.9
Others	5	3.1
Educational qualification		
Primary	38	23.8
Secondary	50	31.3
Tertiary	15	9.4
Other formal	20	12.5
No formal	37	23.1
Experience		
≤10	51	31.9
11-20	66	41.2
21-30	25	15.7
31-40	13	8.1
>40	5	3.1
Household size		
1- 4	33	20.6
5 – 8	84	52.5
9 – 12	34	21.3
Above 12	9	5.6

Source: Analysis of Field Survey, 2019

3.2 Market Structure

The market structure was determined using Gini coefficient index. The market structure analysis is presented in Table 2. This reveals a high inequality in distribution of sales income at all levels as shown by the Gini coefficient of 0.83 for tomato marketers. This indicates a high variation of revenue generated from sale of tomato. This implies that the actions of some marketers could have some influence on others as they had high market power, thus reflecting uncompetitive market conditions.

Table 2: Computation of Gini coefficient for tomato market structure in the study area

Income (₦)	No of sellers	Proportion of sellers (X)	Cumulative proportion of sellers	Total sales	Proportion of total sales (Y)	Cumulative proportion of total sales	XY
<100,000	37	0.23	0.23	2,599,000	0.03	0.33	0.0069
100,000-300,000	63	0.39	0.62	12,083,000	0.12	0.15	0.0468
301,000-600,000	29	0.18	0.80	37,750,000	0.37	0.52	0.0666
601,000 – 900,000	17	0.11	0.91	12,090,000	0.12	0.64	0.0132
>900,000	14	0.09	1.00	36,650,000	0.36	1.00	0.0324
Total	160	1.00		101,172,000			0.1659

Source: Field Survey 2019

3.3 Market Conduct

Quantitative data were collected from the marketers and used to describe the conduct of tomato growers. This involves price determination mechanism i.e. who sets prices is it market forces of demand and supply or market negotiation or haggle? The respondents were asked to indicate factors considered in placing values on their fresh tomato. It was observed that some tomato marketers were also producers/growers. Such marketers usually sell at farm gate price which is much lower than what obtained in the market. Another factor is grading. Tomato fruits are graded according to the ripeness, quality and sizes. All these determine the market price as claimed by almost all the respondents. Almost all the respondents (97.6%) agreed that there is price discrimination i.e the price depends on the buyers. People of seemingly high economic status (with big cars etc.) are expected to pay higher for the same tomato fruits. Also, because there were no price tags and no proper standardization, the price depends on the haggling ability of the buyer. The price also depends on the season. Tomato fruits are cheaper during the dry season probably because it thrives well during the dry season if irrigated and less prone to disease. Estimated prices for tomato fruits in 2018 is presented in Table 3. The table shows that the highest price per basket was 18,146.88 in the month of June followed by May with 15,356.25 and July was 14,925.00. On the other hand, the lowest price per basket full of tomato fruits of 4,533.75, 3,188.05 and 3,901.89 were in the months of December, January and February respectively. Most tomato fruits sold in Ekiti State are brought from the North as claimed by the sellers. Perished tomato fruits are separated and priced low.

Table 3: Estimated price trend of tomato in 2018

Months	Average price/Basket (₦)
January	3188.05
February	3901.89
March	5425.00
April	8371.87
May	15356.25
June	18746.88
July	14925.00
August	10381.25
September	9568.75
October	7200.00
November	5850.00
December	4533.75

Source: Field Survey, 2019

3.4 Profitability analysis of fresh tomato marketing

Table 4: Cost and revenue analysis of fresh tomato marketers

Items	Cost (₦)		Return (₦)
Total Revenue (TR)			**65,040,000**
Average Revenue (AR)			**406,500**
Variable inputs	**variable cost**	**% TVC**	
Cost of purchase	50,888,000	98.183	
Cost of labour	70,000	0.135	
Transportation cost	810,000	1.562	
Local Government levy	29,000	0.055	
Marketing materials e.g basket	6,000	0.011	
Association fee	4,000	0.007	
Storage cost	15,000	0.028	
Rent	5,000	0.009	
Security	3,000	0.005	
Total TVC	51,830,000		
Gross Margin (TR – TVC)			**13,210,000**
Average Gross Margin (AGM)			**82,562.50**
Profitability ratio			**0.25**
Return on Investment			**25.5%**
Benefit cost ratio (BCR)			**1.25**
ME			**1.25**
% ME			**125.5%**

Source: Field Survey, 2019

The costs and returns to tomato marketing was determined and presented in Table 4. The table shows that the cost of purchase was the major cost incurred by the marketers accounting for 98.2% of the total marketing cost. Cost of transportation accounted for 1.6% of total cost. However a TR of ₦65,040,000 and an average Gross Margin (AGM) of ₦82.562.50 were recorded indicating that fresh tomato marketing was profitable in the study area. This is corroborated by the profitability ratio or rate of return on investment (RRI) of 25.5% indicating that for every ₦1.00 spent on fresh tomato marketing, 25kobo is gained by the marketers.

The BCR is equally informative. As shown in the table, the BCR of 1.25 also implies profitability of fresh tomato marketing.

3.4.1 Marketing Efficiency

This is the ratio of total revenue and Marketing Costs expressed as percentage. A ratio of 100% or 1.0 or greater indicates efficient marketing activities while a figure below 100% or < 1.0 indicates inefficiency. As indicated in table 5, fresh tomato marketing is highly efficient with efficiency figure of 125% or 1.25.

3.5 Regression Results

Table 5: Regression results of factors influencing fresh tomato marketing

Variable	Coefficient	t-value
Constant	7.40	2.291**
Age (Years) (X_1)	0.041	0.101
Cost of purchase (X_2)	2.381	1.716*
Tomato marketing experience (X_3)	0.21	1.834*
Labour cost (X_4)	-0.612	1.789*
Transport cost (X_5)	0.738	1.851*
Price/basket/kg (X_6)	0.517	1.937*
Storage cost (X_7)	0.368	1.809*
No of years spent in school (X_8)	0.140	1.608
Distance to the market (Km) (X_9)	-0.013	0.151

Source: Field Survey, 2019. * and ** means significant at10% and 5% respectively.

The factors influencing the sale of tomato fruits were estimated using multiple regression analysis. The functional forms were tried and double log best fitted the data considering the economic criteria. The results are presented in Table 5. The coefficient of multiple determination (R^2) of 0.692 imply that the estimated explanatory variables explained 69.2% of variation in annual income realised from fresh tomato marketing.

The table shows that labour cost and distance to the market were negatively signed indicating that an increase in these variables leads to a decrease in the income realised from the sale of tomato. Cost of purchase, marketing experience, transport cost, price/kg, storage cost and number of years spent in school were positively signed and significant at 10% implying that an increase of these variables would lead to an increase in the income realised by the marketers. Also age was positively signed. The result of costs of purchase, transport and storage contradicts the a priori expectations. Probable reason is that an increase in these variables is an indication of the increase in quantity of tomato marketed hence increase in income realised. For instance the more the quantity of tomato fruits stored, the higher the cost of storage, the higher the market value and consequently the higher the income realized. Ditto for purchase and transportation costs. This is corroborated by the study of Shehu et al. (2014) where cost of purchase was significant and positively signed.

4.0 Summary and Conclusion

This study analysed the structure, conduct and performance of fresh tomato marketing in Ekiti State. The findings showed that tomato marketing was dominated by females with more than half of them 40years and blow. The Gini coefficient of 0.85 indicated a high inequality in distribution of sales income at all levels for tomato marketers. Some tomato marketers had backwardly integrated and their tomato fruits sold at farm gate prices cheaper than other marketers. Because there were no price tags and no proper standardization, the price varied significantly. Despite the intrinsic characteristics of fresh tomato which posed some marketing problems, the marketing was still found to be profitable with Gross Margin of (₦82,000) and profitability ratio of 25.5%. Costs of purchase and transportation were the major costs incurred. Subsidizing the cost of purchase, transportation and distribution will go a long way in reducing the marketing cost and consequently increasing the average gross margin.

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