

Analysis of Structure and Efficiency of Fresh Tomato Retail Marketing in Benue State Nigeria

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ABSTRACT

Efficient tomato marketing depends on how the market is organized in-terms of interrelationship between buyers and sellers. The study investigated the structure and efficiency of fresh tomato retail marketing in the study area. Purposive, Multistage and Simple random sampling method was employed to select 50 fresh tomato retailers in the study area. Primary data were collected using structured questionnaire administered on respondents. Data collected were analyzed using Descriptive Statistics, Marketing Efficiency, Gini Coefficient and Gross Margin. The study revealed that the majority (56%) of the respondent were male while (44%) were female. 46% were married with a mean age of 38 years and a mean income of N50404. The result further showed marketing efficiency of 19.30 indicating that the product was efficient in the study area. The Gini Coefficient was 0.63 which implies that there was competition among tomato retailers in the study area. Despite the intrinsic characteristics of fresh tomato fruits, its sale was profitable judging by the mean Gross Margin of 10, 654.8. Transportation and storage facilities constituted the greatest challenge faced by tomato retailers in the study area. Based on the finding of the studies it was recommended that the retailers should form cooperatives to promote bulk purchase which will in turn reduce transportation charges as well as enable them to achieve the benefits from economies of scale.

Key words: Tomato, Marketing Efficiency, Market, Structure.

INTRODUCTION

(*Lycopersicon esculenta*) is cultivated in both Tropical and subtropical regions of the world. Vegetable crops including tomatoes are widely cultivated by small scale farmers in most states of Nigeria. (Adeolu and Taiwo 2009; Giroh et al 2010). Global production of fruits and vegetables tripled from 396 million MT in 1961 to 1.34 billion in 2003 (International Institute of Tropical Agriculture 2005) and Nigeria ranked 16th on the Global Production Scale, accounting for 10.79% of Africa's and 12% of total world production of tomatoes (Weinberger and Humpkin 2007). Despite this production figure, Nigeria is unable to meet its growing domestic requirements for tomato. Between 2009 and 2010, Nigeria imported a total of 105,000 metric tons of tomato paste valued at over 16 billion naira to bridge the deficit gap between supply and demand in the country (Food and Agriculture Organization 2006). Kalu (2013) attributed this situation to socio-economic constraints surrounding the key actors in the value chain, institutional weakness and declining agricultural research. Tomato production is a major source of income for majority of households in Nigeria. It is grown for its edible fruit which can be eaten raw in salad, cooked and made into puree in canning industries (Achoja and Okoh 2013). Tomato is used as condiments for stew which is a regular feature of African meals. Hence it is an important ingredient in the confectionary industry. In Nigeria, tomato is very

important in the diet of both rural and urban dwellers. Tomato contains protein, edible oil, vitamin, A, B, C and mineral which is useful in human body (Igere and Akinbolu 1994). Population growth and development has led to increase in demand and marketing activities for tomato which is a source of livelihood (i.e it creates employment and generates income) to sizeable number of households in Nigeria.

Obasi and Emenam (2014) asserted that marketing usually begins at the farm when the farmer harvests his products. The products when harvested cannot get to the consumer; because the consumer is likely to be located some distance from the place of consumption. Storage is required to adjust supply to meet demand and the 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). These activities are carried out by intermediaries or middlemen in the marketing process. The production and marketing system of tomato consist of a myriad of relationships and arrangement which are based on structure – conduct relationship paradigms at each market level that is from producers to the consumers. In order to ensure stable supply of tomato throughout the year, the market structure should first be considered in addition to examining how they are produced and disposed. The need for market structure analysis in Agricultural marketing has been emphasized by (Clodus and Mueller, 1967, Obasi and Emenem, 2018).

Marketing structure essentially relates to the degree of competition in the market, that is whether the number of firms producing a product is large or small, whether the firms are equal in size or a small group predominates, whether entry of new firms is easy or not and whether the buyers of the product are few or many. Structure also relates to degree of market information that is available to participants. (Ocholi *et al*,2020).

Tomato marketing is poorly developed in Nigeria. It is characterized mainly by the problem of seasonality and perishability amongst others. Worst still, in the past, the government paid more attention to production with little attention to the marketing of vegetables such as tomato, pepper, onions, garden eggs, okra and leafy vegetables despite the fact that they need spatial marketing facilities (Idachaba 2000). Consequently, losses of 40-50 percent occur for many vegetables mainly due to spoilage, inadequate transportation, sorting, improper packaging and handling and lack of storage facilities. Also, another problem with tomato marketing is in the area of standard weights and measurements, these leave the consumer to their luck and haggling abilities in securing a good deal.

The high perishability nature of fresh tomato discourages many farmers from going into large scale production and prevents growers from increasing their scale of production. This has resulted into low productivity in processing industries and high prices of both fresh and processed tomato products (Egbeadumah, 2008). Therefore, in order to ensure that farmers and marketing agents get a high return on their capital investments, they have to overcome these problems.

A number of studies have been carried out on profitability, structure, efficiency, and performance of tomato marketing and other agricultural products both at national and international planes. For instance Emian (2011) evaluated marketing efficiency of tomato in

Khartoum state, Sudan, Haruna, Sanni Danwanka and Adejoh (2012) worked on economic analysis of fresh tomato markets in Bauchi state, Nigeria. The marketing of tomato in Benue State has not received adequate attention concerning research especially with the nature of competition and marketing efficiency.

While drawing from the experiences of these authors, effort will be made to examine the structure and efficiency of fresh tomato retail marketing in Benue state The specific objectives are to

- Describe the socio-economic characteristics of tomato retail marketers in the study area.
- Analyze the structure of tomato retail market
- Determine the marketing efficiency of tomato retail marketers in study area
- Identify the problems affecting tomato retail marketing in the study area

METHODOLOGY

The Study Area

The area of this study is Benue State of Nigeria. Benue state was created in 1976 and is located in the middle belt region of Nigeria with the capital at Makurdi. Benue state lie approximately between latitudes 6°30'N and 8°10'N of the equator and longitudes 6°35'E and 8°10'E of the Greenwich meridian, [Benue State Agricultural and Rural Development Authority, (BNARDA), 2005]. Benue state is considered as one of the hottest States in Nigeria with an average minimum and maximum temperature of 21°C and 38°C respectively. It is in the southern guinea savannah ecological zone, which has a typical climate with the clearly marked seasons of dry season (late October to March) and wet season (April to early October).

The main annual rainfall in the state is 15000mm. The important feature of the state is the river in which the state derived its name from. The state share boundaries with five States, Nassarawa to the North, Taraba to the East, Cross -River to the Southeast, Enugu to the Southwest and Kogi to the west. The southern part of the state is also bounded with republic of Cameroun. Benue State has a land mass of about 33,955km with 23 local government areas. Geographically and agriculturally, Benue State is divided into three zones, Zone A (Katsina-Ala, Ukum, Shango, Vandeikya, Logo, Kwande and Konshisha local government areas) Zone B (Gboko, Tarka, Buruku, Gwer East, Gwer West, Guma and Makurdi Local government areas), Zone C (Ado, Agatu, Apa, Otukpo, Ohimini, Okpokwu, Ogbadibo, Obi and Oju local government areas).

The state has a total population of 5,741,800 people (National Population Commissions 2006). About 80% of the state population is directly involved in agriculture. The state is also called the food basket of nation, because the state produces agricultural commodities in large quantities. These crops among others are cultivated in great quantity and cash crops like; Palm produce, Cashew, Groundnut, Coffee, Cotton etc. Ginger, being a multi-facet economic crop and having both domestic and international value, its cultivation and marketing is becoming popular within the study area, as its production and marketing cuts across gender groups.

Population and sampling method

The population of the study comprised all tomato sellers in fifteen (15) Local Government Areas in Benue State. The Local Government Areas were Ado, Agatu, Apa, Gwer west. Kastina-Ala, Logo, Obi, Oju, Okpokwu, Tarka, Ukum, Makurdi Gboko, Gwer East and Ushongo.

For the study, purposive, multistage and simple random sampling method was adopted. In the first stage, a purposive sampling was used to select 10 (ten) Local Government Areas based on prior knowledge indicating a high concentration of tomato sellers in the area.

In the second stage, five wards were selected from each of the ten Local Government Areas making a total of fifty wards. In the third stage, one tomato seller from each of the selected wards were selected using simple random sampling, making a sample size of 50 tomato sellers.

Data Collection and Analysis

Primary data were collected using a structured questionnaire on the socio-economic characteristics of tomato sellers, marketing efficiency, structure and constraint associated with tomato marketing in the study area. Prior to the administration of the questionnaires, the questionnaires were pre-tested and necessary corrections were made. Content validity was used to determine the adequacy of the research instrument. In the process, the instrument was thoroughly and independently examined by appropriate experts. The experts gave their critical opinion on the adequacy and relevance of the instrument to the objectives of the study. The observation was harmonized and necessary corrections were made on the instrument before the start of the survey. The test-retest method was used to determine the reliability of the research instrument. Twenty copies of the research instrument were administered twice to the respondents at given intervals. The two results were correlated and a correlation coefficient of 0.920 was obtained indicating high reliability. The data collected for this study were analyzed using both descriptive and inferential statistics. The elements of descriptive statistics such as average, frequency and percentages were adopted to analyze the socio-economic characteristics of tomato sellers in Benue State while marketing efficiency, Gini coefficient, average of Likert scale values were used to analyze the effect of marketing intermediaries on tomato price in the study area.

Models specification

Gini coefficient

Gini coefficient was used to analyse the market structure

$$G = 1 - \sum X_i Y_i, \dots\dots\dots(1)$$

Where:

G – Gini coefficient

1 – constant

X_i – percentage of tomato sellers in the i^{th} class of traders

Y_i – cumulative percentage of tomato sellers in the i^{th} class of traders.

i – 1,2,3.....5

The Gini coefficient ranges from 0 to 1, where 0 implies perfect equality in the distribution (perfect market) and 1 implies perfect inequality (imperfect market), the closer the Gini

coefficient is to zero, the greater the degree of equality, and the lower the level of concentration, the more competitive the markets are.

Marketing efficiency

Pricing efficiency was calculated using the formula given by Khols and Uhl (1967) which was used by Olukosi and Isitor (1990) and later used by Babatunde and Oyatoye (2000) in estimating the marketing efficiency of maize in Kwara State.

The formula specified that:

$$\text{Marketing Efficiency} = \frac{\text{value added by marketing activities}}{\text{MarketCost}} \times 100 \dots \dots \dots (2)$$

In order words,

$$\text{Marketing Efficiency} = \frac{\text{Net Margin}}{\text{MarketCost}} \times \frac{100}{1}$$

Gross Margin

The Gross Margin model specified from the point of view of estimation of total expenses (costs) as well as various returns or revenue within a tomato marketing period. In line with (Ekerete and Asa, 2014) gross margin model is specified as follows:

$$\text{Gross Margin (GM)} = \text{TR} - \text{TVC}$$

Where,

TR = Total Revenue

TVC = Total variable cost (Loading and offloading cost, rent on store, local government fee, market levy, sacks, transport cost, security, etc)

Total revenue

$$(\text{TR}) = \text{Q.Py} \dots \dots \dots (3)$$

Where,

Q = Quantities of tomato sold (basket)

Py = Unit price of tomato (basket)

Fixed cost was not included because it was negligible

Marketing Margin Analysis

$$\text{Marketing margin} = \frac{\text{Sellingprice} - \text{purchaseprice}}{\text{Sellingprice}} \times 100 \dots \dots \dots (4)$$

Where,

Selling price = the return tomato sales,

Purchase price =cost price

Where the marketing costs (N) include: purchase cost, transport cost, loading cost, storage cost, market levy, cost of bags/baskets, local government levy.

Likert scale mean

A four-point Likert scale was used. The responses were very important, important, moderate and less moderate. Their weight were: very important (4), important (3), moderate (2), less moderate (1).

The model for the Likert mean score is given below:

$$\frac{n_1w_1 + n_2w_2 + \dots + n_4w_4}{\sum n_i}$$

Where: $i = n_1n_2n_3n_4$

Likert mean score = [(number of people who selected response 1) × (weighing of response 1) + (number of people who selected response 2) × (weighing of response 2) ... (number of people who selected response n) × (weighing of response n)] / (total number of respondents).

RESULTS AND DISCUSSION

Socioeconomic characteristics of tomato retailers

The results of the socioeconomic characteristics of tomato retailers show that 56% of respondents are male while 44% are female. This implies that men are more active in tomato retail marketing than women in the study area. Similarly the study of Haruna et al (2012) of tomato marketing in Bauchi revealed that majority (88%) of the respondents were men while only 12% were women. The very low percentage that accounted for women participation in tomato marketing has to do with religion and culture of the people in the study area, which emphasized more on domestic economic activities of women than outdoor home ventures. Another factor could likely be connected with the tedious nature of the business, in which most women are considered to be weak in handling it than their men counterpart.

Results also showed that 28% are single, 46% are married, 14% are divorced while 12% are widowed/widower. This implies that most of tomato retailers are married meaning that there is a tendency of stability among them as far as marriage is concerned which may likely increase their productivity. This is similar to the study of Obayelu et al (2014) that said majority (67.5%) of the marketers are married.

Also, the results show that the mean age of tomato retailers is 38.42 years. This implies that retailers are in the productive age which could lead to increase their efficiency. Specifically, 22% are between 32-35 years, 52% are between 36-39 years and 14% are between 40-43 and 12% are between 44-47 years. Similarly, the study of Egbeadumah et al (2016) state that the mean age of respondents is 38.7 years implying that majority of tomato retailers are within the economically active age. Specifically, 16.25% of tomato retailers' age range is between 21 to 30 years; 42.5% of respondents' age range is between 31 to 40 years; 33.75% of respondent's age range is between 41 to 50 years and 7.5% of respondent's age range is between 51 to 60 years. The research further showed that the average annual income is 50404 Naira. This average low income could be explained by the fact that majority of retailers are operating in small scale businesses. Specifically, 8% have annual income of 1-25,000 Naira, 48% have annual income of 25001-50000 Naira, 34% have annual income of 50001-75000 Naira and 10% have annual income of 75001-100000 Naira. This is supported by the findings of Sanusi and Dada (2016) that some (27.5%) of the marketers earned between N5000.00 - N7000.00 income per week in Olodo market in Ogun State.

The average household size is 7.44. This implies that there is availability of family labour and this could lead to reduce cost of marketing. Specifically, 22% have 4-6 members, 72% have 7-9 members and 6% have above 9 members in their households. This is supported with the study of Camillus et al which presents similar results for the retailers with 63% of them having a

household size of 2-5 members while 37% have between 6 and 10 members. Also, the study of Egbeadumah et al (2016) supports this finding that 10% of tomato retailers have household size of 1 to 4 members; 62.5% of respondents have 5 to 8 members; 23.8% of respondents have 9 to 12 members; 2.5% of respondents have 13 to 16 members and finally 1.3% of respondents have 21 and above members. Since majority have household 5 to 8 members there is an evidence of the availability of family labour as well as household size is of great importance to sustain small scale business.

The average marketing experience is 7.74 years. This implies that tomato retailers are experienced enough to manage their activities. Specifically, 6% have 2-4 years of experience, 34% have 5-7 years of experience, 54% have 8-10 years of experience and 6% have 11-13 years of experience as supported by Maimouna and Jing (2013) that 9 wholesalers (22.5%) and 6 retailers (15%) had an experience of between 1 and 3 years, 17 wholesalers (42.5%) and 12 retailers (30%) practiced for 3 to 5 years, while 14 wholesalers (35%) and 22 retailers (55%) have more than 5 year experience. Also the findings of Oladejo and Oladiran (2014) supports that 48.5% had less than 10years of experience while only 3.0% had greater than 30years of experience in tomato marketing. The mean was 13years, implying that most respondents have adequate knowledge and exposure concerning the enterprise.

The mean of education is 5.16 years. This implies that retailers are literate enough to acquire additional knowledge to expand their businesses. Specifically, 28% have no formal education, 56% have 6 years of education and 14% have 12 years of education as supported by Camillus et al (2014) For the retailers, the results of the study showed that 26% of tomato retailers in Ashanti Region of Ghana are illiterates, 40% had a maximum of primary education while 26% of them were also educated up to the Middle or Junior High School level.

Table 1: Socio-economic characteristics

Variables	Frequency	Percentage	Mean
Sex			
Male	28	56	
Female	22	44	
Marital status			
Single	14	28	
Married	23	46	
Divorced	7	14	
Widow/widower	6	12	
Age (years)			38.42
32-35	11	22	
36-39	26	52	
40-43	7	14	
44-47	6	12	
Major occupation			
Trader	50	100	
Annual income (Naira)			50404
1-25000	4	8	
25001-50000	24	48	
50001-75000	17	34	
75001-100000	5	10	
Household size			7.44
4-6	11	22	
7-9	36	72	
>9	3	6	
Marketing experience (years)			7.74
2-4	3	6	
5-7	17	34	
8-10	27	54	
11-13	3	6	
Education (years)			5.16
0	14	28	
6	29	56	
12	7	14	

Sources: Field Survey, 2020**Gross Marketing Margin**

The results of the gross marketing margin shows that the selling price ranges between 2500 and 5600 with mean and standard deviation of 3986Naira and 743.684 respectively while buying price ranges between 2000 and 5000 with mean and standard deviation of 3142 and 753.520 respectively. Therefore, the gross marketing margin ranges between -42.85 and 42.85 with mean and standard deviation of 21.14 and 11.77 respectively. This value could be explained that price volatility may likely affect the gross marketing of retailers. The result further implies that as far as the gross marketing margin is concerned the mean gross marketing margin of retailers could increase or reduce by 11.77. The study of Adeoye and Ibe

(2013) supports this finding that the average cost prices of a basket (40 kg) of tomatoes were estimated at N 2,200 and 6,000 during the peak and lean season respectively for retailers. The margin for the retailers is N 500 and 700 per basket of 40 kg during the peak and lean seasons respectively. Each retailer was found to sell an average of 1 and 3 baskets during the lean and peak season respectively.

Table 2: Mean Gross Marketing Margin; Buying and Selling Prices

	Minimum	Maximum	Mean	Standard deviation
Buying price	2000	5000	3142	753.520
Selling price	2500	5600	3986	743.684
Gross marketing margin	-42.85	42.85	21.14	11.77

Sources: Field Survey, 2020

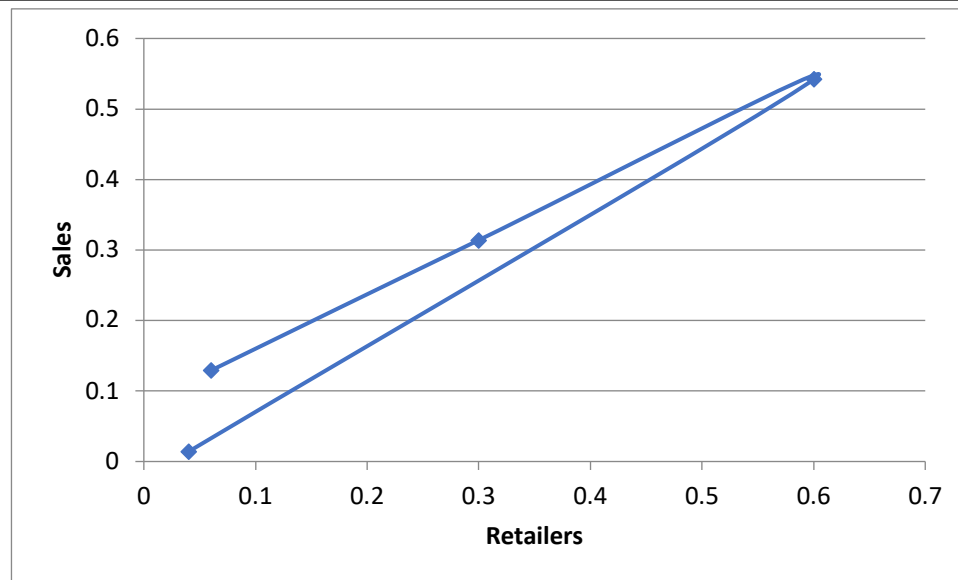
Market Structure

The results of the market structure shows that Gini coefficient is 0.63. This implies that there is competition among tomato retailers in the study area. This is supported by the findings of Adeoye and Ibe (2013) that the results of the Gini coefficient for the peak and lean season were 0.45 and 0.25 respectively. This implies that tomato retail market is perfectly competitive indicating that there were many retailers in the market such that none of them had control over the largest portion of total sales.

Table 3: Computation of Gini Coefficient for tomato Retail Market Structure

Categories of sales	Number of producers marketers	Proportion of producers (X_i)	Total values of annual sales	Proportion of annual sales (Y_i)	$\sum X_i Y_i$
1-25000	4	0.08	54800	0.023	0.0018
25001-50000	25	0.5	1003100	0.424	0.212
50001-75000	16	0.32	993700	0.42	0.1344
75001-100000	5	0.1	313500	0.13	0.013
Total	50		2365100		0.3612
Gini Coefficient	0.6388				

Sources: Field Survey, 2020



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Gross Margin

The results of the profitability shows that on the average total variable cost ranges between 6,460 and 67,150 with mean and standard deviation of 38,339.20 and 14,484.580 respectively while total revenue ranges between 7,500 and 81,000 with a mean and standard deviation of 48,994.00 and 17,863.078 respectively. This implies that total gross margin ranges between 1,040 and 27,880 with mean and standard deviation of 10,654.80 and 5,672.465 respectively. This implies that the business is profitable among tomato retailers. The result further implies that as far as gross margin is concerned the mean gross margin of tomato retailers could increase or reduce by 5,672.465. This result could also be due to the purchased cost which constitutes 98.54 % of total variables cost. To support this finding, Shehu and Mohammed (2017) has it that the gross revenue, total variable and fixed costs obtained from tomato marketing per month were N899,248, N589,153 and N7,419 respectively, leaving a gross margin of N310,095. The costs and returns analysis indicated that tomato marketing was profitable in the study area with a monthly gross margin of N310,095.

Table 4: Cost and Revenue analysis of Fresh tomato Retail Marketing

	Minimum	Maximum	Mean	Standard deviation
Transport cost	0	200	95	48.91
Loading cost	0	50	28.40	23.505
Offloading cost	0	50	21.00	22.61
Storage cost	0	0	0	0
Market levy	0	100	46.40	25.456
Cost of bags/basket	300	300	300	.000
Local government levy	20	150	66.40	26.708
Purchased cost	6000	66500	37782	14,467.581
Total variable cost	6,460	67,150	38,339.20	14,484.580
Total revenue	7,500	81,000	48,994.00	17,863.078
Gross margin	1,040	27,880	10,654.80	5,672.465

Sources: Field Survey, 2021

Marketing Efficiency

The result of marketing efficiency shows that net margin ranges between 1,040 and 27,880 with mean and standard deviation of 10,654.80 and 5,672.465 respectively while marketing cost ranges between 400 to 750 with mean and standard deviation of 557.20 and 74.012 respectively. Therefore, the marketing efficiency ranges between 2.260 to 44.967 with mean and standard deviation of 19.302 and 10.1388 respectively. This implies that tomato retailers are efficient given that on the average their marketing efficiency is greater than 1 as supported by the study of Adeoye and Ibe (2013) that the marketing efficiency for retailers were 1.2 and 1.1 for peak and lean seasons. This also indicates efficiency in retail marketing of fresh tomatoes in the study area. Similarly, the study of Egbeadumah et al (2016) supports the finding that the result of Market Efficiency (M.E) is 1.31 and shows that for every naira invested, 1.31 naira is realized. Therefore, tomato retailers in Abeokuta south are economically efficient.

Table 5: Estimation of Marketing Efficiency of Fresh Tomato

	Minimum	Maximum	Mean	Standard deviation
Net margin	1,040	27,880	10,654.80	5,672.465
Marketing Cost	400	750	557.20	74.012
Marketing Efficiency	2.260	44.967	19.302	10.1388

Sources: Field Survey, 2021

Constraints

The results of constraints using four-point likert scale show that the mean of the selected constraints were less than the benchmark (2.5). This implies that the selected constraints cannot jeopardize the activities of tomato retailers. This is contrary to the study of Egbeadumah et al (2016) that the top five problems facing the retailers are transportation, losses due to breakage, losses due to rodent attack, poor quality of products and shortage in supply.

**Table 6: Constraint to the Marketing of Fresh Tomato
Descriptive Statistics**

	N	Mean	Decision
transportation	50	1.38	Disagree
storage facilities	50	1.38	Disagree
credit facilities	50	1.40	Disagree
debt	50	1.30	Disagree
taxes levies	50	1.44	Disagree
Lack of Insurance	50	1.56	Disagree
Seasonality	50	1.52	Disagree
Robbery	50	1.34	Disagree
capital	50	1.32	Disagree
Valid N (listwise)	50		

Sources: Field Survey, 2021

CONCLUSION

The findings of the study revealed that tomato retail marketers in the area were mostly male, married with large household size within the active age, well experienced, educated and high-income earners. The structure of the market was characterized by inequitable distribution of

sales income with free entry and exist, the markets in the area were efficient and competitive. However, transportation and storage problems constituted the greatest challenge faced by tomato marketers in the area.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

- i. Efforts should be made to eliminate the constraints to tomato marketing in the study area by improving on socioeconomic facilities such as roads, markets and related amenities. The Benue State government can do its own part by renovating existing bad roads and constructing new ones, especially those that link the points of supply to points of consumption; and
- ii. The marketers should be encouraged to form co-operative societies to promote bulk purchase and transportation of tomato in the area. This will reduce the high cost of transportation involved in the marketing of these commodities as well as enable them achieve the benefits from economy of scale.

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