

## Analysis of Structure and Efficiency of Cassava Marketing in Ado-Ekiti Local Government Area of Ekiti State, Nigeria

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### ABSTRACT

The study examined the structure and marketing efficiency of cassava in Ado-Ekiti Local Government Area of Ekiti State, Nigeria. Primary data were obtained using structured questionnaires and multistage sampling method was employed to select 183 respondents comprising 93 farmers and 90 marketers. The Herfindahl-Hirschman Index and Gini Coefficient were used to measure the degree of market concentration and the nature of competition in the market. The Herfindahl-Hirschman indices were 0.323, 0.346, and 0.316 for farmers, wholesalers, and retailers, respectively, suggesting that the market was uncompetitive at all levels. The computed values of Gini coefficient for cassava farmers, wholesalers, and retailers were 0.532, 0.465, and 0.569, respectively, indicating uneven distribution of income and uncompetitive market conditions. Two channels of cassava marketing were identified and the study demonstrates that the farmer-wholesaler-retailer-consumer channel had higher marketing efficiency and thus provides marketers with better opportunities for making more profits. Based on the findings, it is recommended that micro credit facilities should be made accessible to market actors to encourage investment and improve efficiency in cassava marketing.

**Keywords:** Cassava, marketing efficiency, Ekiti, Herfindahl-Hirschman Index, Gini Coefficient

### INTRODUCTION

Root and tuber crops are among the most important groups of staple foods in many tropical African countries and constitute the largest source of calories for the Nigeria population (Olaniyan *et al.*, 2001; Abdulrahman *et al.*, 2016). Cassava (*Manihot esculenta*) is the most important of these crops in terms of total production, followed by yam (*Dioscorea spp*), Cocoyam (*Colocasia spp* and *Xanthosoma spp*) and sweet potato (*Ipomoea batatas*) (Olaniyan *et al.*, 2001).

Cassava is an important staple food in Africa, especially in Nigeria where it plays a major role in the food economy and has traditionally been a subsistence crop of predominantly low-income families in rural and urban areas of Nigeria (Adebayo *et al.*, 2009). Since cassava thrives well in low rainfall areas with poor soils and requires very little investment during the production cycle, the crop is well embraced by resource-poor small-scale farmers. A large

population of Nigeria depends on cassava daily as their main dishes such as *gari* and *fufu*. The leaves are consumed as vegetable, and it serves as raw material for industries as well as a means of alleviating poverty.

Cassava has assumed particular importance because approximately two-thirds of the world's cassava production takes place in West Africa and mainly in Nigeria. According to the Food and Agriculture Organization of the United Nations (2018), Nigeria is the world's largest producer of cassava with a production of about 59 million tons in 2017 over a cultivated area of about 3.7 million ha. Cassava is produced largely by small scale farmers using rudimentary implements and capital is a major limiting factor as only few farmers have access to rural credit. The average land-holding is less than two hectares and for most farmers; land and family labour remain the essential input.

In Nigeria, as in many developing countries, smallholder farmers are faced with numerous complex challenges including low crop yields, poor infrastructure, poor access to credit and extension services, inefficient and unorganized marketing systems, and information asymmetries which act to increase transaction costs of accessing the input and output markets (Bernard, *et al.*, 2010; Mojo *et al.*, 2017; Abdul-Rahaman and Abdulai, 2018). These problems hinder the growth of competitive markets and limit the opportunity of farmers to raise their incomes and improve their livelihoods. Consequently, addressing these myriads of constraints in order to encourage the emergence of well-structured and efficiently organized marketing systems is particularly important.

To increase the competitiveness of cassava in the domestic and international markets, there is a need for public-private efforts to be intensified in ensuring efficiency in the marketing system. An efficient marketing system increases producers' share in consumer price, improves rural incomes and revenue generation for both producers and marketers, and significantly contributes to sustainable agricultural development (Enibe *et al.*, 2008; Kumar, 2014; Ruttoh *et al.*, 2018). Through various policies and initiatives, the government of Nigeria has expressed its determination in developing the cassava value chain and creating efficient markets for farmers. However, smallholder cassava farmers have continued to face problems in the marketing of their produce due to widespread inefficiencies within the marketing system, resulting in significant differential between consumer and producer prices.

This study provides some evidence that may help in understanding the structure under which cassava marketing is promoted. By analyzing the structure and efficiency of cassava marketing, we hope that the findings of this study will help in the design of effective policies and strategies towards improving efficient marketing systems.

## MATERIALS AND METHODS

### Description of Study Area

This study was conducted in Ado-Ekiti Local Government Area (LGA) of Ekiti State, Nigeria. Ado-Ekiti LGA is located between latitude 7° 37'16" N and 5° 13'17" E and between longitude 7.62111° N 5.22139° E. It shares boundaries with Ikere and Iseorun in the south, Gboyin in the east, Ido-Osi and Oye in the north, and Ekiti West and Ijero in the west. Ado-Ekiti has a total land area of 293 km<sup>2</sup> and elevation of 455 m above the sea level with a projected population of 427,700 in 2016 (National Population Commission of Nigeria, 2006). It is a town in the southern guinea savannah of the ecological zones of Nigeria. The local government has a distinct wet and dry season. The rainy season lasts from April to October while the dry season falls between November and March. The majority of the people of this LGA are small-scale farmers and the rich and diversified soil condition enable agriculture to thrive in this area. The climate of this area is tropical and the good soil condition favours the growth of crops such as yam, cassava, maize, potato, vegetable, pulses, and tree crops such as plantain, cocoa, banana, cashew, mango, kola nut, and guava. The local government has 13 wards with Idofin as the administrative headquarters.

### Sampling Procedure and Sample Size

A two-stage sampling method was used to select the respondents in the study area. The first stage involved purposive selection of 5 wards out of 13 in the study area. The selected wards are those with registered cassava farmers. The second stage consisted of random selection of 93 cassava-producing farmers from the total population size of 122 registered cassava farmers using the formula proposed by Yamane (1967) and adopted by Oladimeji *et al.* (2017) and Egwuma *et al.* (2019).

$$n_0 = \frac{N}{1 + N(e^2)} \quad (1)$$

Where:  $n_0$  is the sample size without considering the finite population correction factor;  $e = 0.05$ ;  $N$  = total number of observation.

In addition, purposive sampling method was used to select 10 marketers each from 9 wards making a total of 90 cassava marketers. The reason for this sampling method is that cassava markets are available in only nine wards out of the thirteen wards in the study area. Furthermore, the wards are homogeneous and cassava marketing is a common activity in the study area.

### Analytical Techniques

This study employed the Herfindahl-Hirschman Index (HHI) and the Gini Coefficient (GC) to measure the degree of market concentration and the nature of competition in the market for cassava. Market concentration measures the share of total transaction or sales by a given number of market participants in a particular market. The HHI can be expressed as follows:

$$HHI = \sum_{i=1}^t MS^2 \quad (2)$$

Where  $MS$  represents the market share for seller  $i$  and  $t$  is the total number of sellers in the market. The market share,  $MS$ , which refers to the proportion of the sales of a seller relative to others is given as follows:

$$MS_i = \frac{Q_i}{\sum_i^t Q_i} \quad (3)$$

Where  $Q_i$  is the quantity of cassava handled by seller  $i$  and  $\sum Q_i$  is the sum of cassava handled by all the sellers in the market. Following Krivka (2016), Hrazdil and Zhang (2012), and Rutttoh *et al.* (2018), if the HHI is less than 0.1 the market is said to be unconcentrated, indicating a competitive market condition. HHI of between 0.1 and 0.18 represents moderate concentration and HHI of more than 0.18 indicates high market concentration.

The Gini Coefficient model can be expressed as follows:

$$GC = 1 - \sum XY \quad (4)$$

Where  $GC$  = Gini Coefficient,  $X$  = percentage share of each seller per period of study,  $Y$  = cumulative percentages of total sales (revenue). The GC has a value ranging from 0 to 1, indicating the extent to which the market is concentrated. Gini coefficient is equal to 0 when the market is perfect and competitive and 1 when the market is imperfect.

Marketing efficiency was used to determine how efficient the markets are in terms of cassava marketing. Marketing efficiency can be expressed as follows:

$$\text{Marketing Efficiency} = \frac{\text{Value added by marketing per ton}}{\text{cost of marketing activities per ton}} * 100 \quad (5)$$

Where,

Value added by marketing = Retail price less the producer price

Cost of marketing activities = Cost of transport, commission agent share, loading and off-loading.

The results of the HHI,GC and marketing efficiency are all presented using Tables.

## RESULTS AND DISCUSSION

### Market Concentration of Cassava Producers

The HHI of cassava producers is reported in Table 1. The value of the HHI of cassava producers is 0.323 indicating that the market structure at the producer level exhibits an oligopolistic nature. This implies that a large proportion of cassava produced and sold is controlled by a few producers. In addition, the GC at the producer level is 0.532 and signifies an imperfect market with a high level of inequality in the distribution of sales revenue (Table 2). Furthermore, the results show that about 27.9% of cassava producers each earned ₦30,000 and below, representing 10.7% (₦524,000) of the total sales revenue of ₦4,877,600 while 36.6% of producers made ₦31,000-60,000 each which account for 30.1% (₦1,467,600) of total sales income. Also, 30.1% of producers made about ₦61,000-120,000 representing 44.8%

(₦2,188,000) of total sales income while 5.4% of producers earned above ₦120,000 each which account for 14.4% (₦698,000) of total sales revenue. This high variation in sales revenue reveals uncompetitive market conditions where some cassava producers have high market

power and could influence the price and other marketers in the area. The result corroborates the findings of Afolabi (2009) and Ruttoh *et al.* (2018).

**Table 1:** Herfindahl-Hirschman Index for cassava producers in Ado-Ekiti

Range of Quantity of Cassava Produced (Kg)	Quantity of Cassava Produced (Kg)	Market Share ( $MS_i$ )	Square of Market share ( $MS^2$ )
≤ 2,000	48,400	0.1684650	0.0283804
2,001 – 4,000	134,200	0.4671076	0.2181895
4,001 – 6,000	76,200	0.2652280	0.0703459
6,001 – 8,000	20,000	0.0696136	0.0048460
> 8,000	8,500	0.0295858	0.0008753
Total	287,300	1	<b>0.3226371</b>

Source: Field Survey, 2018

**Table 2:** Gini coefficient for cassava producers in Ado-Ekiti

Income Range (₦)	Freq	Cumul. Freq.	Proportion of Producers (X)	Cumul. Proportion of producers	Total Sales Revenue (₦)	Proportion of Sales	Cumul. Proportion of Sales (Y)	XY
≤ 30,000	26	26	0.279	0.279	524,000	0.107	0.107	0.030
31,000-60,000	34	60	0.366	0.645	1,467,600	0.301	0.408	0.149
61,000-90,000	24	84	0.258	0.903	1,781,800	0.365	0.773	0.199
91,000-120,000	4	88	0.043	0.946	406,200	0.083	0.856	0.037
121,000-150,000	4	92	0.043	0.989	544,000	0.112	0.968	0.042
>150,000	1	93	0.011	1	154,000	0.032	1	0.011
Total	93		1		4,877,600	1		0.468

Gini Coefficient =  $1 - \sum XY = 1 - 0.468 = 0.532$

Source: Field Survey, 2018

#### Market Concentration of Cassava Wholesalers

The results of the HHI and GC for cassava wholesalers are presented in Tables 3 and 4, respectively. The estimated value of the HHI for wholesalers is 0.346 which means that cassava market at the wholesale level is highly concentrated, reflecting uncompetitive condition. The computed GC is 0.465 and implies a high variation in sales revenue at the wholesale level. In particular, about 45.2% of wholesalers each earned ₦50,000 and below which account for

23.6% (₦623,500) of total sales revenue of ₦2,642,200 while 42.9% of wholesalers made ₦51,000-100,000 each which account for 50.5% (₦1,335,200) of total sales income. Also, 11.9% of wholesalers earned above ₦100,000 each reflecting 25.9% (₦683,500) of total sales revenue. This result suggests a very high variation in revenue obtained from the sale of cassava amongst the wholesalers, reflecting inefficient and uncompetitive market conditions. The result is consistent with the findings of

Issahaku *et al.* (2012), Eronmwon *et al.* (2014), Nzima and Dzanja (2015), and Fadipe *et al.*

(2015) that reported high inequality in incomes at the wholesale level of marketing.

**Table 3:** Herfindahl-Hirschman Index for cassava wholesalers in Ado-Ekiti

Range of Quantity of Cassava handled (Kg)	Quantity of Cassava sold per time period (Kg)	Market Share ( $MS_i$ )	Square of Market share ( $MS^2$ )
≤ 500	3,300	0.0784780	0.0061588
501 – 1,000	22,050	0.5243757	0.2749699
1,001 – 1,500	8,700	0.2068966	0.0428062
1,501 – 2,000	5,900	0.1403092	0.0196867
> 2,000	2,100	0.0499405	0.0024941
Total	42,050	1	<b>0.3461157</b>

Source: Field Survey, 2018

**Table 4:** Gini Coefficient for Cassava Wholesalers in Ado-Ekiti

Income Range (₦)	Freq	Cumu l. Freq.	Proport ion of Produc ers (X)	Cumul. Proport ion of produc ers	Total Sales (₦)	Proport ion of Sales	Cumul. Proporti on of Sales (Y)	XY
≤ 50,000	19	19	0.452	0.452	623,500	0.236	0.236	0.107
51,000-100,000	18	37	0.429	0.881	1,335,200	0.505	0.741	0.318
101,000-150,000	4	41	0.095	0.976	443,500	0.168	0.909	0.086
>150,000	1	42	0.024	1	240,000	0.091	1	0.024
Total	42		1		2,642,200	1		0.535

Gini Coefficient =  $1 - \sum XY = 1 - 0.535 = 0.465$

Source: Field Survey, 2018

### Market Concentration of Cassava Retailers

Tables 5 and 6 show the results of the HHI and GC for cassava retailers. The HHI value of 0.316 reflects a highly concentrated market at the retail level, indicating uncompetitive market condition. The computed GC is 0.569, which further supports this conclusion and implies an economically inequitable distribution of trade volume among cassava retailers in the study area. About 25% of retailers each earned ₦20,000 and below which account for 8.7% (₦188,100) of total sales revenue of ₦2,153,300 while 35.4% of retailers made ₦21,000-40,000 each which account for 25.6% (₦550,800) of total sales income. Furthermore, 35.4% of retailers earned ₦41,000-100,000 each reflecting 52.2% (₦1,124,400) of total sales income while about

4.2% made above ₦100,000 each reflecting 13.5% (₦290,000) of total sales income.

Overall, we find a high level of inequality in the distribution of income at the three levels of cassava marketing in the study area. This could be attributed to low access to adequate capital by most of the various agents, which limits their ability to invest in cassava marketing. According to Ruttouh *et al.* (2018), capital is a very critical factor in marketing and determines the level of investments, and hence, earnings. In addition, agricultural marketing inherently involves risk and market actors who engage in risky investments are likely to make more profits (Giroh *et al.*, 2010). Our results are similar to the findings of Fadipe *et al.* (2015), Nzima and Dzanja (2015),

Abah *et al.* (2015), and Rutttoh *et al.* (2018) who found evidence of the existence of high variation of income distribution in marketing of agricultural commodities. These studies suggested that high-

income inequalities among market actors could be credited to wide variations in investment levels and probably barriers to entry.

**Table 5:** Herfindahl-Hirschman Index for cassava retailers in Ado-Ekiti

Range of Quantity of Cassava handled (Kg)	Quantity of Cassava sold per time period (Kg)	Market Share ( $MS_i$ )	Square of Market share ( $MS^2$ )
≤ 200	100	0.0027473	0.0000075
201 – 400	300	0.0082417	0.0000679
401 – 600	9,500	0.2609890	0.0681153
601 – 800	5,900	0.1620879	0.0262724
801 – 1,000	16,700	0.4587912	0.2104894
> 1,000	3,900	0.1071429	0.0114796
Total	36,400	1	<b>0.3164321</b>

Source: Field Survey, 2018

**Table 6:** Gini Coefficient for Cassava Retailers in Ado-Ekiti

Income Range (₦)	Freq.	Cumu l. Freq.	Proporti on of Produce rs (X)	Cumul. Proporti on of produce rs	Total Sales (₦)	Proportio n of Sales	Cumul. Proporti on of Sales (Y)	XY
≤ 20,000	12	12	0.250	0.250	188,100	0.087	0.087	0.022
21,000-40,000	17	29	0.354	0.604	550,800	0.256	0.343	0.121
41,000-60,000	7	36	0.146	0.750	368,500	0.171	0.514	0.075
61,000-80,000	9	45	0.187	0.937	655,900	0.305	0.819	0.153
81,000-100,000	1	46	0.021	0.958	100,000	0.046	0.865	0.018
>100,000	2	48	0.042	1	290,000	0.135	1	0.042
Total	48		1		2,153,300	1		0.431

$$\text{Gini Coefficient} = 1 - \sum XY = 1 - 0.431 = 0.569$$

Source: Field Survey. 2018

### Marketing Efficiency

There are two major channels of cassava marketing in the study area. Marketing Channel 1 involved farmers who sold cassava directly to retailers who, in turn, sold to the final consumers. In Channel 2, farmers sold cassava to wholesalers. The wholesalers, in turn, sold to the retailers, and the retailers then sold to the final consumers. The results of marketing efficiency based on these two channels are reported in Table 7. In Channel 1, the average cost of

marketing was ₦3,270 but the value added through marketing was ₦6,730 while in Channel 2 the average cost of marketing was ₦3,950 but the value added through marketing was ₦10,120. The results reveal that the marketing efficiency for Channels 1 and 2 are 205.81% and 256.20%, respectively. This implies that cassava marketing through channel 2 was more efficient than channel 1 and marketers can find better opportunities for making more profits through channel 2.

**Table 7:** Marketing efficiency of cassava marketers in Ado-Ekiti

Parameters	Channel 1	Channel 2
Producer price of cassava (₦/ton) A	26,410	26,410
Selling Price (₦/ton) B	33,140	36,530
Value added (₦/ton) B-A	6,730	10,120
Marketing cost (₦)		
Transport (₦)	2,500	3,000
Loading/off-loading (₦)	600	750
Commission agents (₦)	170	200
Total marketing cost (₦) C	3,270	3,950
Marketing Efficiency $\frac{B-A}{C} * 100$ (%)	205.81	256.20

Source: Field Survey, 2018

## CONCLUSION

The analysis of cassava marketing in the study area shows that cassava marketing was characterized by imperfect competition where a few actors controlled larger shares of marketed output at all levels. The computed values of Gini coefficient for cassava farmers, wholesalers, and retailers reveal that income is not equally distributed, indicating imperfect markets. A larger share of cassava sales revenue is in the hands of few marketers. The study further shows that cassava marketing in the study area consisted of two channels producing different levels of value addition. The results show that channel 2 comprising of farmer-wholesaler-retailer-consumer had higher marketing efficiency and marketers can find better opportunities for making more profits through channel 2. Based on the findings of this study, it is recommended that micro credit facilities should be made accessible to market actors to encourage investment in cassava marketing.

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