Original Article

Assessment of Dried Plantain Marketing in Akure-North Local Government Area of Ondo State, Nigeria

Aiyejuyo OO[1]*, Olalere IT[2], Bello MA[3], Ayoola RO[2], Bello J[3]

[1]Department of Agricultural Economics, Faculty of Agriculture, University of Ibadan, Ibadan, Nigeria
[2]Food and Resource Economics, Faculty of Land and Food System, University of British Columbia, Vancouver, Canada
[3]Department of Agricultural Economics and Farm Management, Faculty of Agriculture, University of Ilorin, Ilorin, Nigeria.

*Corresponding Author

Aiyejuyo OO, E-mail:
oyinladeaiyejuyo@gmail.com

A B S T R A C T

Despite the numerous prospects and potentials that the marketing of plantain and its products holds, studies seem not to have existed on the marketing of dried plantain in Nigeria. Although several researches have been conducted to examine the economics of plantain processing and marketing, there appears to be a paucity of knowledge with respect to dried plantain marketing. It is on this premise that this study assess the marketing of dried plantain in Akure-North Local government of Ondo State, Nigeria. Specific objectives of the study include: examining the market structure and conduct of dried plantain market, estimating the profitability of dried plantain marketing, identifying the factors that influence the profitability of dried plantain marketing and identifying the various constraints militating against dried plantain marketing. A multi-stage sampling technique was used to select one hundred respondents in the study area and well-structured questionnaires were administered to collect relevant data. Gini-coefficient, regression analysis and gross margin analysis were used to analyse the data collected for the study. The results from the analysis showed that 58% of the marketers were within their economic productive age. About 54% of the marketers were females and a total of 65% were married. Analysis revealed that the dried plantain market was dominated by retailers which accounted for 50% of the marketers. A Gini-coefficient of 0.6 is an indication of high-level concentration in dried plantain market and an unequal income distribution among the marketers. The profitability analysis revealed further that dried plantain marketing is worthwhile with an average profit of ₦24,730 per month and a return of 18% or ₦0.18, for every ₦1 invested. The significant profitability determinants identified from the regression analysis include purchase cost and transportation cost involved in dried plantain marketing. The constraints faced by dried plantain marketers in the study area include irregular supply, low demand, transportation challenges, high cost of supply and perishability of the product. This study, therefore, recommended the need for government and relevant stakeholders to address infrastructural challenges such as bad roads. We also recommended that the marketers should form cooperative society to facilitate their marketing operations and also enable them to have access to credits and expand their business.

Introduction

Plantain (*Musa spp.*) is a major staple food crop in the eastern region of Nigeria, where its annual per capita consumption exceeds 200 kilograms. In the West and Central Africa, the production and trading of plantain exceed 10 million tons annually (Folayan and Bifarin, 2011). Over the last decade, the demand for plantain is on the increase, as evidenced by its relatively high price and emergence as a major raw material in many delicacies and snacks (Aina *et al*., 2012; Nwibo and Mbam 2016). Because of its great multipurpose potential, it can contribute to consumer food security as well as provide income for marketers and

farmers. Adejoro *et al*. (2010) reported that plantain has the potential to help improve the food security status of the country and reduce rural poverty.

Globally, Nigeria is among the largest plantain producers in the world (Kainga and Seiyabo, 2012). Plantain is produced commercially in many states in Nigeria, namely: Ogun, Ondo, Oyo, Edo, Delta, Cross River, Akwa Ibom and Rivers States. It is also produced in Kwara, Niger, Sokoto, Benue, Plateau, Bauchi, Borno States but majorly under irrigation (Bifarin *et al.,* 2010). Based on bunch characteristics, there are four predominant varieties available in Nigeria. These include French type, false horn type, French horn type, and horn type (Swennen and Ortiz, 1997). In West and Central Africa, about 70 million people have been estimated to derive 25% of their carbohydrate requirement from plantains, which make the crop one of the most energy sources in African lowland and humid forest areas (Swennen**,** 1990).

Plantain products such as chip (fried unripe pulp), *dodo* (fried ripe pulp) and plantain flour are of great nutritional value to many households in Nigeria (Adepoju *et. al*. 2012). Other products include its roasted form (*boli*), plantain pudding and boiled plantain. Dried plantain is processed into plantain flour which can be eaten with soup. Nutritionally, plantain contains protein, minerals and vitamins which makes it more advantageous than other starchy foods. Medically, it is used to treat several diseases and infections which include but are not limited to sore throat, tonsillitis, diarrhoea, and vomiting. Soya-*musa,* which is used in the treatment of kwashiorkor, consists of plantain due to its high nutrients (Idachaba, 1995).

Studies have shown that plantain production and processing have the potential to contribute positively to the economy majorly as a source of livelihood for rural dwellers, thus reducing rural-to-urban drift. Plantain is an income source for smallholder farmers that produce it on a small-scale sole farm, mixed-farm and compound farms (Bayer, 2001). In Nigeria, women are key players in the marketing of plantain and plantain products, either by selling it as roasted plantain (*boli*), whole fruits (*ogede*) or drying into dried plantain, all of which are thriving enterprises which provide streams of income to the marketers.

Plantain production is confronted with numerous problems which often determine if the production can be expanded or not. Such problems can be solved with the introduction of new technologies and marketing system that are efficient and to achieve this, an understanding of the marketing system is imperative. Due to the seasonality and shelf-life of plantain, its availability is for a very brief period and with significant post-harvest losses. Therefore, because of this perishable nature, processing is an important function of the marketing process (Akalumbe, 1999). Meanwhile, the storage, processing, and transportation facilities are critical for improving the plantain value chain and marketing. Considering this, it is reasonable to conclude that if the plantain marketing system is thoroughly understood, the production may be adequately increased to address food insecurity issues in Nigeria.

In recent years, the production of plantain flour from dried plantain has been on the increase due to the versatile processing potential of the crop. Therefore, venturing into the marketing of dried plantain holds promising potential for marketers. Despite this prospect, existing studies have been focusing on the production and marketing of fresh plantain fruit with little or no empirical studies on the marketing of dried plantain. On this basis, this study assesses the marketing of dried plantain in Akure North LGA, Ondo state. The specific objectives explored in this study include: examining the structure and conduct of the dried plantain market, estimating the profitability of dried plantain marketing, identifying the factors that influence profitability in the marketing of dried plantain, and lastly, identifying various constraints militating against dried plantain marketing in the study area.

Methodology of Research
The Study Location
The study was conducted in Akure North Local Government Area of Ondo State, Nigeria. Ondo State comprises eighteen Local Government Areas with a population of 2,255,713 (2006 census). The state is bounded in the west, north, east and south by Osun and Ogun State, Ekiti and Kogi State, Edo and Delta state and the Atlantic Ocean respectively identified for its tropical climatic condition. The state experiences heavy rainfall between April and October (rainy season) and dry wind between November and March (dry season) which accounts for the reason why a large proportion of the inhabitants are farmers. Other occupations found in the state include trading, commerce and manufacturing. The riverine dwellers are predominantly fishermen. Akure North is a Local Government Area in the state with a coordinate of 7° 15′ 46″ N, 5° 18′ 57″ E and headquarter situated in a developed town of Iju/Itaogbolu with a population of 131,587 and an area of 660 km^2 (250 sq mi) at the 2006 census.

Data Source and Sampling technique
For this study, primary data were collected with the use of well-structured questionnaire using a multistage sampling technique for respondents' selection. Akure North Local Government was purposively selected in the first stage of sampling based on the predominance of dried plantain marketing in the area. The second stage involved the random selection of five markets from Akure North LGA namely, Ogbese, Itaogbolu, Iju, Ughele, Oba-ille. The last stage involved the random selection of twenty dried plantain marketers from each of the five markets already selected, thus making a total of one hundred respondents. The questionnaire was supported with personal interview questions to retrieve general information on dried plantain marketing in the study area.

Method of Data Analysis
Descriptive statistics, Gini-coefficient, gross margin analysis, and regression analysis were used to analyse the data collected for the study.

Gini-Coefficient
This was used to examine the dried plain market's structure, that is, the concentration of dried plantain marketers in the study area. Gini-coefficient is often employed to measure the relative degree of income of respondents in a given sample. Gini-coefficient was estimated using the expression below:

Gini coefficient= 1-$\sum XY$

Where, X = the percentage of dried plantain marketers

Y= Sales income cumulative percentage

$\sum$ = the summation of XY

The Gini-coefficient value ranges from 0 to 1. A closer value to 0 indicates a greater degree of equality in income

distribution and the lower the degree of market concentration, thus the more competitive the market. Similarly, the closer the value is to 1, the greater the degree of inequality in income and the higher the level of market concentration and imperfect market. Hence, a value of 1 represents a perfect inequality in income distribution (i.e., an imperfect market) while a value of 0 represents perfect equality in income distribution (i.e., a perfect market).

Gross Margin Analysis

Gross margin analysis was used primarily to estimate the profitability of dried plantain marketing in the study area. This was calculated as total revenue less total variable cost.

$GM = TR - TVC$

Profitability is also represented as total revenue less total cost

$\pi = GM - TFC$

Where, GM = Gross Margin, TR = Total Revenue, TVC = Total Variable Cost, TFC = Total Fixed Cost and π = Profit

Regression Analysis

This was used to figure out the key factors affecting the sales revenue of dried plantain marketers in the study area using Ordinary Least Square (OLS) estimates.

The implicit functional form is given as:

$Y = f(X_1, X_2, X_3, X_4, X_5, \varepsilon)$

Where;

Y is the dependent variable which represents the sales revenue of dried plantain marketers in naira and $X_1 - X_5$ are independent variables denoted as:

X_1 = Age
X_2 = Educational level
X_3 = Marketing experience (in years)
X_4 = Cost of purchase
X_5 = cost of transportation

ε = error term.

The relationship between the sales revenue of dried plantain marketers with all the independent variables were further examined using functional forms including linear, semi-log and double-log functional forms. Based on economic criteria, statistical significance and *a priori* expectation, the best equation representing the Best Linear Unbiased Estimate (BLUE) functional form was selected.

Linear Function

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$

Semi-log Function

$Log\ Y = log\ \alpha + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \beta_4 logX_4 + \beta_5 log\ X_5 + \varepsilon$

Double-log Function

$Y = \alpha + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \beta_4 logX_4 + \beta_5 log\ X_5 + \varepsilon$

Results and Discussion
Characteristics of dried plantain marketers

Socio-economic characteristics of dried plantain marketers are represented in Table 1. The result reveals that females dominate the dried plantain with 54% while the males only make up 46% of the proportion. This implies that the dried plantain marketing is majorly occupied by women in the study area than men. Men are involved in other activities that require more energy such as loading and off-loading of plantain. This is in resonance with Aina *et al.*, (2012), who reported that women take a greater percentage of foodstuff trading in Nigeria. Furthermore, the table revealed that 58%,

25% and 17% of the marketers were between 21-40, 41-60 and 61-80 years of age respectively, implying that dried plantain marketers are in their economic productive age. This also aligns with research conducted by Agbagwa *et al.*, (2020) on the 'Structural Analysis of Plantain Marketing in Port Harcourt Metropolis, Rivers State, Nigeria where a larger percentage of plantain marketers 51.6% falls between 30–39 years.

The result further reveals that 65% of respondents are married; this is an indication that dried plantain marketing is a major livelihood source for the family. This result is close to the value gotten by Folayan and Bifarin (2011). With regards to the educational level of respondents, 60% of the dried plantain marketers had secondary education while 25% had primary education. This implies that plantain marketing does not require any form of expertise or educational trainings. The marketing experience of dried plantain is the measurement of periods (in years) that an individual has been involved in that trade. The result shows that 77% of dried plantain marketers have been in the trade for less than 10 years. This implies that marketers can use their knowledge of the market price in the last 10 years to make a better forecast of future dried plantain prices and proffer possible solutions to any problems which will in turn generate better profit.

Table 1. Distribution of dried plantain marketers by demographic characteristics.

Variables	Frequency (n=100)	Percentage (%)
Sex		
Male	46	46
Female	54	54
Age (years)		
21-40	58	58
41-60	25	25
61-80	17	17
Marital status		
Single	10	10
Married	65	65
Divorced	20	20
Widowed	5	5
Educational level		
Primary	25	25
Secondary	60	60
Tertiary	10	10
No formal	5	5
Years of marketing experience		
<10	77	77
10-20	21	21
>20	2	2
Household size		
Christianity	55	55
Islamic	40	40
Others	5	5

Structure and conduct of dried plantain market

Market structure relates to certain characteristics of the market that influences the nature of competition that exist in the market and the process of price formation. Among such characteristics are the size and categories of dried plantain buyers and sellers, methods of price determination etc. Market conduct also describes certain behaviours of firms in the market e.g., pricing practices, sources of information to the consumers etc.

The structure and conduct of the dried plantain marketers are represented in Table 2. The result from the assessment shows

that 50% of the marketers were retailers, 20% were wholesalers and 30% served as both wholesalers and retailers concurrently. This suggests that the dried plantain market in the study area is dominated by retailers. This finding synchronises with Afolabi (2009) who reported that the marketing of agricultural products is predominantly dominated by retailers. This may be attributed to the small capital investment required to start the business at the retail level. The result also revealed that 50% and 15% of the respondents sourced dried plantain directly from major farms and personal farms respectively. This is an indication of profit maximization opportunity for the marketers. The result also revealed that 84% of the marketers claimed that the cost of dried plantain acquisition (purchase price) was used as a basis for setting prices of the product in the market. This implies that purchase price is the major determinant of the price of dried plantain in the market. The ability of the buyers to bargain (48%) helps in shaping the trading price of dried plantain in the market. Furthermore, 15% of the marketers claimed that the prices were determined by the quantity of dried plantain purchased by the buyers. Therefore, it is clear-cut that market forces were the determinants of the prevailing market price of dried plantain. The result also revealed that only 32% of the marketers indicated membership in marketing associations. This reveals the existence of a marketing association for dried plantain marketers in the study area, although only a few are registered members. To attract customers, marketers claimed they use both open display and persuasive effort methods. On the sources of market information, the result revealed that 82% of the marketers obtained information on market activities from other marketers.

Table 2. Distribution of dried plantain marketers by market structure and conduct.

Variables	Frequency	Percentage (n=100)
Category of marketers		
Retailers	50	50
Wholesalers	20	20
Wholesalers/Retailers	30	30
Source of dried plantain purchase		
Personal farms	15	15
Major farms	50	50
Wholesalers	10	10
Other Marketers	25	25
Categories of buyers of dried plantain		
Consumers	37	37
Wholesalers	11	11
Retailers	43	43
Wholesalers/Retailer	9	9
Price Determination		
Cost of acquisition	51	51
Ability of buyer to bargain	48	48
Price set by the market association	33	33
Quantity purchased by buyer	15	15
Membership of Market Association		
Members	32	32
Non-members	68	68
Method of Attracting Customers		
Open display	82	82
Persuasive effort	90	90
Discounted price/extra	37	37
Sources of Market information		
Friends	28	28
Other Marketers	82	82
Market associations	44	44

The 0.6 Gini-coefficient value in Table 3 shows that the dried plantain market in the study area is highly competitive with high inequality in the income from the sales revenue among the dried plantain marketers. This implies high level of concentration in dried plantain market in the study area. This result corroborates the findings of Akintade (2020) who reported that the value of Gini-Coefficient greater 0.35 is high, indicating inequality in the distribution of sales income.

Table 3. Computation of Gini-Coefficient.

Income (₦)	No. of Marketers (Frequency)	Total income (₦)	% of Marketers (X)	% of Total Income	Cumulative % of Marketers	Cumulative % of Total Income (Y)	XY
<10,000	7	56400	7	1.04	7	1.04	0.001
10000 – 19999	6	94600	6	1.75	13	2.79	0.002
20000 – 29999	9	233050	9	4.31	22	7.10	0.006
30000 – 39999	13	463550	13	8.56	35	15.66	0.020
40000 – 49999	11	506270	11	9.35	46	25.01	0.028
50000 – 59999	15	842445	15	15.56	61	40.57	0.061
60000 – 69999	18	1147930	18	21.21	79	61.78	0.111
70000 – 79999	7	542680	7	10.03	86	71.81	0.050
80000 – 89999	5	461050	5	8.52	91	80.33	0.040
90000 – 99999	4	394180	4	7.28	95	87.61	0.035
>100000	5	670900	5	12.39	100	100	0.050
Total	100	5413055	100	100			0.404

Note. Gini coefficient is given as: $G = 1 - \sum XY = 0.6$, where G = Gini coefficient, X and Y are percentage of dried-plantain marketers and Cumulative percentage of total income from the sales of dried plantain respectively.

Profitability of Dried Plantain Marketing

Table 4 presents the profitability per month of dried plantain marketing in the study area. The revenue and profit accrued from the sales of dried plantain from the marketers were ₦163,520 and ₦24,730 respectively. The result shows a profit margin percentage of 15.12%. This implies that the

marketers can convert 15.12% of their sales into a profit. The ratio of the return per naira invested by the marketers is ₦1.18, which implies that every naira value invested into the business will generate 18% (₦0.18) return. Adopting these performance measures, we can safely conclude that in the study area, plantain marketing is profitable.

Table 4. Profitability per month of dried plantain marketing.

S/N	Items	Amount (₦)	Ratio
1	Total Revenue	163520	
2	Cost of storage	23570	
3	Cost of transportation	11000	
4	Cost of purchasing dried plantain	77850	
5	Others	26370	
6	Total Variable Cost	115220	
7	Total Fixed Cost	23570	
8	Total Cost (TVC + TFC)	138790	
9	Gross Margin (1 – 6)	48300	
10	Profit (1 – 8)	24730	
11	Profit Margin Ratio (10/1 * 100)		15.12%
12	Return on Investment (1/8)		1.18

Table 5. Determinants of dried plantain profitability.

Variables	Linear	Semi-log	Double-log
Constant	0.343	0.081	0.221
	(0.352)	(0.351)	(0.035)
Age	0.232	0.540	0.085
	(0.188)	(0.630)	(0.048)
Educational Level	–0.059	-0.069	-0.107
	(0.091)	(0.071)	(0.621)
Years of Experience	0.090	0.019	-0.094
	(0.207)	(0.108)	(0.945)
Purchase Cost	–1.074***	0.984**	9.610**
	(0.042)	(0.067)	(0.588)
Transportation Cost	–0.145*	0.098	1.9103**
	(0.915)	(0.068)	(0.652)
R^2	0.992	0.981	0.85
Adjusted R^2	0.988	0.939	0.81
F-Value	231.456	154.66	115.435

*, ** and *** indicates significance at 10%, 5% and 1% respectively

Constraints of Dried Plantain Marketing
Table 6 is a highlight of the challenges faced by dried plantain marketers. High cost to procure supplies was ranked as the first major constraint at 53% facing dried plantain marketing. A plausible cause of this problem could be because of the scarcity of plantain during the off-season. The result supports past studies (Ahmed and Omolehin, 1999; Ariyo *et al.*, 2013) that have documented that high cost of purchasing agricultural supplies is more pronounced during the off-seasons when the products are scarce. Irregular supply is the second ranked major constraint at 28% being faced by dried plantain marketers in the study area. This might be as a result of shortage and surplus of the product during the on- and off-season. Also, transportation challenge is ranked the third major constraint faced by the dried plantain marketers. This challenge according to the

Determinants of Dried Plantain Profitability
The regression output is presented in Table 5 which was employed in identifying the profitability determinants of dried plantain marketing in the study area. The table also shows a strong relationship between the profits of dried plantain making and the independent variables as 98.8% of the variation in the profit of the dried plantain marketers were explained by the independent variables. From the regression output, it was also revealed that purchase cost was negative at 1% significant level. The outcome is in line with the *a priori* expectation and implies that as the purchasing cost of dried plantain increases, the profit made by the marketers reduces. The transportation cost coefficient was also negative at 10% level of significant which implies that as the transportation cost of dried plantain increases, the profit made by the marketers reduces.

respondents can be attributed to bad roads, inadequate transportation facilities and high transportation cost.

Table 6. Constraints of dried plantain marketing.

Constraints	Frequency	Percentage	Rank
Transportation challenge	10	10	3rd
Low demand	6	6	4th
Irregular supply	28	28	2nd
High cost of supply	53	53	1st
Perishability	3	3	5th

Conclusion and Recommendation
Having assessed dried plantain marketing in Akure North Local Government, results show that the market is perfectly competitive. Furthermore, there exists high level of sales inequality among the marketers. The implication of this is that certain groups are able to control the market price of the

commodity. Results further revealed that the marketers purchase their produce directly from the farm in order to maximize profit and the major determinant of sales price in the market is the cost of acquisition of dried plantain. Although, the marketing of dried plantain in the study area as established by this study as profitable, it is however faced with some major constraints such as high cost of supply, irregular supply, transportation challenge, low demand and perishability. Based on the findings of this research, this study recommends that Government and other stakeholders should make effort to address infrastructural challenges such as bad roads which is a precursor of high cost of transportation. This would reduce the marketing cost of dried plantain and subsequently the price, thus enhancing the competitiveness of dried plantain relative to other close substitute products in the market and, ultimately increase its demand. The dried plantain marketers can also come together to form a marketing cooperative that will facilitate their marketing operations and enable them expand their business.

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