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RESEARCH ARTICLE

Unravelling the Drivers of Plantain Marketing in Enugu State, Nigeria

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Abstract: Plantain marketing offers great profit-making, yet it is unclear if this has translated to more profits, making it imperative to examine the drivers of plantain marketing. Primary data collected with structured questionnaire in purposive 2-staged random sampling were analyzed using net marketing income, marketing margin, marketing efficiency and multiple linear regression models. Plantain marketing was mainly done by married educated women, averaged 40 years of age, belonging to households averaging 6 persons. Net monthly profit of $63.51 (₦26,050.38), average marketing margin of 30.84% and marketing efficiency of 35.06% were returned. Suggesting plantain marketing is profitable and viable but largely inefficient. Cost of plantain and marketing experience were positively significant ($p \leq 0.05$). Plantain marketing faced constraints like seasonality of plantain, inadequate finance, price fluctuations, high transportation costs, bulkiness, spoilage/breakage and high plantain costs. Plantain marketers should form/join cooperatives to obtain low-interest loans, mitigate marketing costs and enjoy economies of scale.

Keywords: Cost and returns; Marketing efficiency; Marketing margin; Multiple regression; Plantain

1. Introduction

In recent times, there have been agricultural reform campaigns propelled by global food and financial crisis. Just like every other developing country, Nigeria too, is engrossed in this global crusade to improve agricultural production and efficiency in marketing. Agriculture involves the production of commodities (goods and services) and until these commodities reach the final consumer, production is yet to be complete, thus the essence of marketing being fundamental in agriculture [1]. Efficient marketing systems are vitally important for any economy under all conditions and at every stage in its development [2]. As marketing channels used by farmers to sell the outputs of their production play important roles in their productivity [3]. This perhaps is due to the specific nature (perishability and level of processing) of agricultural production and its products, in particular, complex transportation and storage problems require a greater number of intermediaries in

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their movement from producers to consumers [4]. So, the ultimate aim of the producer, which is to get rewards, irrespective of the channels used to market the products that are targeted at turning potential customers into profitable customers is achieved, this is one of the key roles of marketing channels [5]. Lack of knowledge on the marketing of some crops such as plantain and their products partly leads to the inherent poor agricultural commodity marketing in Nigeria. Hence, there is a need for efficient marketing channels and systems.

Plantain is well consumed in Enugu State and thus has a large market, especially in the city centres and semi-urban areas such as Nsukka Local Government Area (LGA). Nsukka LGA, in itself has large market centres, operating daily or every four days. Agricultural products such as banana, plantain, vegetables, pepper, mangoes, palm oil, honey, yam, livestock and other fruits are commonly traded in those markets [6,7]. In the area, banana and plantain are mostly cultivated mixed with other plants, as backyard crops in compound farms, where farmers usually have less than 50 stands, with a greater proportion of them growing more banana than plantain [8]. However, banana and plantain marketing are most prominent among women, especially within Nsukka Urban, and the neighbouring communities. The sale of banana and plantain provides means of livelihood for many households in the area, hence, its decentralization, as both wholesalers and retailers purchase their commodities directly from the producers [9]. In urban centres, the wholesalers sell to the retailers who in turn resell smaller quantities to the ultimate consumers.

Poor post-harvest handling practices, amongst other problems, has been militating against agricultural production in Nigeria, observing that the problem of productivity is further compounded by poor storage and marketing, thus, aggravating loss of quality and quantity, hence, affecting the final price of agricultural commodities [10]. Plantain is seasonal and its shelf life is relatively short; hence, its availability is for limited periods of time, thereby incurring very high post-harvest losses [8,11-14] and studies on plantain marketing have shown that plantain fruits are subjected to adverse conditions during handling and transportation [15,16].

A lot of marketing problems determining whether to expand production or not affect the plantain business [17]. The marketing of plantain is very difficult because of the dispersal of the production zones, the lack or poor conditions of the lines of communication with urban consumption centres and the irregular supply in the market by wholesalers and middlemen who set the prices. It is insufficient for policymakers to focus on solving production-related problems alone, because even if production eventually becomes adequate, marketable and marketed surplus may not be enough and reliable [18]. That is to say, to increase food production, it becomes imperative to evolve a more efficient marketing system, in which marketing information makes it easy to transmit prices from one market to another, as such, synchronizing prices.

Venturing into plantain enterprise holds promising potentials, however, there is a little study to back up marketing of plantain within Nsukka LGA, as the relatively little attention given to plantain in this study area focused on its production technology (characterization, correlation, path analysis and selection indices of Musa genotypes under different conditions) [11-14]. Increasing output (production) without correspondingly increasing marketing may bring about resource wastage and as such, people may continue to wallow in poverty and food insecurity [19].

A related study centering on banana and plantain marketing activities by women in the Nsukka urban area, specifically dwelt on the decision-making role, the pattern of marketing among the women and their constraints in marketing the products [13]. Also, the research carried out on plantain and banana marketing in Enugu State centered on examining the structure of plantain and banana marketing, identifying banana and plantain marketing channels, estimating banana and plantain marketing margins at the retail and wholesale levels, estimating the rate of price transmission and the extent of market integration among banana and plantain markets [9]. However, despite the contributions of plantain marketing to the livelihood survival of most marketers, there is little study conducted to identify the drivers of the enterprise. This gap in literature necessitated a comprehensive study on the determinants of plantain marketing, so as to promote speedy sales, reduce losses and enhance profits and improve the efficiency of its marketing system.

The broad objective of the study is to unravel the drivers of plantain marketing in Nsukka Local Government Area (LGA) of Enugu State, Nigeria. Specifically, the work described the socioeconomic characteristics of plantain marketers; determined the cost and returns on plantain marketing; determined the drivers of net marketing returns of plantain; estimated the marketing margin and efficiency of plantain marketers and identified the constraints to plantain marketing in the study area.

2. Methodology

2.1 The Study Area

The study was carried out in Nsukka LGA of Enugu State, Nigeria. An area that lies between latitudes 6°51′N

and 6.85°N of the Equator and longitudes 7°23′E and 7.39°E of the Greenwich Meridian [20]. It has a land area of about 1,810 square kilometres and a population of about 309,633 and comprised of 16 communities [21]. Nsukka is situated in the derived savannah belt and has two main seasons; the rainy and dry seasons, with a total annual rainfall that ranges from 1500 mm to 1600 mm, while the average temperature is 27 °C [22]. The inhabitants are mainly subsistence farmers and traders. The crops grown and marketed in the area include, but not limited to plantain, cassava, yam, maize, vegetables and different varieties of fruits. There are many markets in the study area such as *Ogige, Orie Orba, Nkwo Okutu, Orie Okpuje, Afor Opi*, *Eha-Alumona, Eke Ede-Oballa* and *Ikpa* commodity markets.

2.2 Data Collection

Primary data were collected with the aid of a well-structured questionnaire. A modified purposive multi-stage (two-staged) simple random sampling technique was used; in the first stage, four markets with a large concentration of plantain marketers were purposely selected. The markets selected were *Ogige, Afor Opi, Orie Okpuje* and *Eha-Alumona* markets. In the second stage, a list of plantain marketers was drawn from each of the selected markets and a simple random sampling technique was used to select 30 plantain marketers from each market, making a total of 120 respondents as sample size. Data collected were analyzed using descriptive statistics, net marketing income, net marketing margin, marketing efficiency index and multiple linear regression model.

The scope of this study is limited to the activities of plantain marketers who do business daily in the four markets sampled. Data collected were on socioeconomic characteristics, marketing channels, prices, quantities and other associated costs for marketing plantain. However, certain limitations were encountered, especially in the aspect of data collection. Many respondents were afraid of responding, thinking that their responses would be used to make tax assessments. But, repeated assurances, backed with identity cards made them believe that the questionnaires had nothing to do with taxing agencies, thus eliciting their responses. Another challenge faced was that of time. Most of the respondents complained that their time is being wasted in answering questions, so the field officers compensated for that by buying some of their merchandise to encourage them. To check for consistency of responses, the researchers employed the internal consistency method, by repeating certain questions in another way in other sections of the questionnaire.

2.3 Data Analyses

2.3.1 Net Marketing Income

The difference between the total sales of plantain and the total marketing costs per month was used to represent net income. Total marketing cost embodies summing up the costs of the produce, along with that of transportation, storage, handling, and other associated costs involved in moving the commodity from the point of purchase to the customer, together with the depreciation of marketing equipment used in the process (see Equation 1).

$$\pi = \mathrm{TR} - \mathrm{TC} \quad (1)$$

where π is net marketing income, TR is total revenue, given by price per quantity and TC is total cost.

The total cost component, TC is derived from the formula in Equation (2).

$$TC = \mathrm{TVC} + \mathrm{TFC} \quad (2)$$

where TVC is total variable cost and TFC is total fixed cost.

The straight-line method given by the formula in Equation (3) was used to calculate the depreciation of the marketing equipment.

$$D = \frac{P-S}{n} \quad (3)$$

where D is the depreciation, P is purchasing price of the equipment, S is salvage value of the equipment and n is the useful life of equipment.

2.3.2 Multiple Regression Model

The model was explicitly specified as:

$$\mathrm{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots + \beta_n X_n + \varepsilon \quad (4)$$

where:

Y = Net Returns from plantain marketing (₦)

α = Intercept on the Y-axis

β = Coefficients

X_1 = Age of respondents (years)

X_2 = Marketing experience (number of years in plantain marketing)

X_3 = Household size (number)

X_4 = Marital status (married =1, otherwise 0)

X_5 = Number of years spent in school (years)

X_6 = Cost of plantain (₦)

X_7 = Marketing cost (₦)

X_8 = Access to credit (access =1, otherwise 0)

ε = Stochastic error term

The model is specified in its four functional forms thus:

Linear function:

$$\mathrm{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots + \beta_8 X_8 + \varepsilon \quad (5)$$

Semi-log function:

$$Y = \alpha + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \ldots + \beta_8 logX_8 + \varepsilon \quad (6)$$

Double-log function:

$$logY = \alpha + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \ldots + \beta_8 logX_8 + \varepsilon \quad (7)$$

Exponential function:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2^2 + \beta_3 X_3^3 + \beta_4 X_4^4 + \ldots + \beta_8 X_8^8 + \varepsilon \quad (8)$$

The econometric criteria such as coefficient of multiple determination, number of significant variables, the size of the F-ratio and the standard error were used to select the lead equation from the four functional forms of the multiple regression model.

2.3.3 Marketing Margin

Plantain marketing margin (MM) was derived by taking the difference between the average selling and purchase prices of the marketers, that was gotten from the average prices reported by each respondent. Like Aina et al., (2012) did, the marketing margin was expressed as a percentage in Equation (9).

$$\%\ MM = \frac{Selling\ Price - Purchasing\ Price}{Selling\ Price} \times \frac{100}{1} \quad (9)$$

2.3.4 Marketing Efficiency Index

The Marketing Efficiency (ME) as applied by Nse-Nelson, Oke and Adindu (2016) was computed using:

$$ME = \frac{Output\ of\ marketing}{Input\ of\ marketing} \times \frac{100}{1} \quad (10)$$

Marketing output was measured using net marketing returns, while marketing input was measured as total marketing cost. Marketing efficiency, then follows as:

$$\%ME = \frac{Net\ marketing\ Returns}{Total\ Marketing\ Cost} \times \frac{100}{1} \quad (11)$$

If ME equals one; it is efficient, less than one is inefficient, however, greater than one is said to be highly efficient.

2.3.5 Likert Scale Rating Technique

A 4-points Likert scaling, calibrated as Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), with values that correspond to 4, 3, 2 and 1 respectively was used. The respondents' mean score (MS) based on the 4-points scale, was computed with cut-off placed at 2.50. This implies that any mean score below 2.50 (MS<2.50) was insignificant, while those above 2.50 (MS>2.50) were significant and regarded as major constraints.

3. Results and Discussions

3.1 Socio-economic Characteristics of the Respondents

The results as can be seen in Table 1, showed that females dominated (95%) the plantain business in the study area. This is in conformity with the findings of other related studies [23-25]. Plantain production is dominated by men [26], but then, women play a key role in processing and marketing or perhaps, because women generally prefer self-employment to either working for other people, private organizations or even the government [27]. Similar to another study [28], this study revealed that majority (73.3%) of the plantain marketers were married, suggesting that plantain marketing most probably serves as a reliable source of income for family upkeep.

With an average age of 40 years, the study indicated that most (75%) of the respondents were relatively young marketers, who fall within the active years of service (less than 50 years), are tireless, energetic, willing to take risks, full of vigour and can go through the rigours of marketing, thus conforming to findings in a related study [24]. With an average of 6 persons per household, many of the households (55%) however have sizes of 6 members or lower. Although this is higher than the reported family size of 5 persons/household [29]. This suggest that the families are averagely normal families within the government recognized family size of 6 persons, which includes father, mother and four children [30]. This is an indication that the families are moderate and not over-laden or overburdened with responsibilities since they are within the officially recommended family size [31].

Table 1 further showed that the greater number of marketers (88.3%) have had a minimum of primary school education, in consonance with findings from a similar study [32]. Having, at least, basic education could imply better adoption of new ideas and knowledge which will help in taking decisions to improve marketing as well as strategies. The majority of the respondents (66.7%) had gained reasonable experience, of at least 6 years in plantain marketing. This implies that most of the respondents have been marketing plantain long enough to offer reasonable verifiable information about the business. The high proportion of respondents who source their capital from personal savings, may imply that the marketers do not have access to credit facilities or security for loans. This confirms the findings of a similar study which reported that the greatest proportion of plantain marketers (54.7%) sourced their capital from personal savings, while lower proportions (33.3% and 12%) obtained capital from friends and cooperatives respectively [33].

3.2 Cost and Returns in Plantain Marketing

The results of the monthly cost and return analyses are presented in Table 2.

From Table 2, net marketing returns of plantain sold

per month indicated that plantain enterprise was viable. Average quantities of plantain sold per month by the marketers were 63 bunches. The average selling price per head of plantain was ₦1,592.83 **(**$3.88) while the average purchasing price was ₦1,101.66 **(**$2.69). The mean monthly marketing returns made by the marketers was ₦26,050.38 **(**$63.51).

Table 1. Socio-economic characteristic of respondents

Variable	Frequency	Percentage (%)	Mean
Gender			
Female	114	95	
Male	6	5	
Marital Status			
Married	88	73.3	
Single	32	26.7	
Age			
20-30	42	35	
31-40	22	18.3	40.36
41-50	26	21.7	
50-70	30	25	
Household size			
1-3	8	6.7	
4-6	58	48.3	6.25
7-10	54	45	
Level of education			
No formal Education	34	28.3	
Primary	66	55	
Secondary	14	11.7	
Tertiary	6	5	
Marketing experience			
1-5	40	33.3	
6-10	22	18.3	10.3
10 & above	58	48.4	
Source of Capital			
Relative/Friends	26	21.7	
Personal Savings	78	65	
Cooperatives	16	13.3	

Source: Computed from field data, 2020

Table 2. Monthly costs and returns structure of plantain marketing in Nsukka

Market variables	Amount (₦)	Amount ($)
Revenue (A)	100,348.29	(244.64)
Variable Costs		
Average cost price per bunch	1,101.66	(2.69)
Cost of plantain	69,404.58	(169.20)
Handling cost	1,024.45	(2.50)
Transportation cost	1,204.16	(2.87)
Storage cost and Rent	2,232.32	(5.44)
Marketing fee	381.17	(0.93)
Total Variable Cost (B)	**74,246.68**	**(181.01)**
Fixed Cost:		
Depreciated values of trading materials (C)	51.23	(0.12)
Total Marketing Cost (B + C = D)	**74,297.91**	**(181.13)**
Net Marketing Returns (A − D)	**26,050.38**	**(63.51)**

Source: Computed from field data, 2020
Exchange Rate: $1USD = ₦410.19

3.3 Mean Marketing Margin and Efficiency of Plantain Marketers

The mean marketing margin of plantain marketers presented in Table 3, expressed as a percentage showed that the marketing margin for the marketers was 30.84%.

Table 3. Monthly mean marketing margin and efficiency of plantain marketing

Mean Selling Price (₦)	Mean Purchase Price (₦)	Marketing Margin (%)
1,592.83	1,101.66	30.84
Net Marketing Returns (₦)	**Total Marketing Cost (₦)**	**Marketing Efficiency (%)**
26,050.38	74,297.91	35.06

Source: Field data, 2020.

In Table 3, the results displayed shows that plantain marketing is viable and a good source of livelihood survival. Marketing efficiency of 35.06% (0.35) indicates that the marketing of plantain was not efficient as about 65% of inefficiency existed in the system, implying that

certain challenges exist in the marketing of plantain in Nsukka LGA. This result is consistent with another study that examined the performance of watermelon marketing in Enugu State, Nigeria [34].

3.4 Drivers of Net Returns in Plantain Marketing

Regression results displayed in Table 4 show the drivers of the net income of plantain marketers. The linear functional form was selected as the equation of best fit and was thus used for further discussion. The R^2 value of 0.45 shows that 45% of the variations in the net marketing returns were explained by the variations in the independent variables. The purchasing cost of plantain and marketing experience of the marketers were statistically significant in influencing plantain marketers' net marketing returns and therefore, the major drivers of the enterprise in the study area. The coefficient for cost of plantain was positive (0.2518676) and statistically significant at the 5% probability level ($p \leq 0.05$). This implied that the higher the price of plantain, the higher the net marketing returns of plantain marketers, while a decrease will lead to a decrease in the net marketing income.

Results in Table 4 indicate that net marketing returns are majorly attributed to the relative scarcity and seasonality of plantain in the study area and as such marketers tend to make more profit, despite the high cost of purchase, due to an increase in demand, but with relatively limited supply. The results are consistent with findings by a similar study on the determinants of net marketing returns of watermelon in Enugu State, Nigeria[35] and other studies in Southwestern Nigeria which showed that cost of plantain was significant in determining the level of profit among plantain marketers [36,37]. The result also showed that the experiences of the plantain marketers over the years play a major role in driving the profit level of the marketers. Thus, a unit increase in marketer's experience leads to a 0.195021 increase in the profit level of the enterprise. The result is in tandem with the *a priori* expectation, which posited that an experienced marketer is better positioned to use his or her experiences acquired over the years to navigate any new or old challenges in the plantain marketing enterprise. An experienced marketer knows the best place and time to buy or sell his or her goods, so as to maximize profit and minimize marketing and associated costs. The result however contradicts another study that

Table 4. Drivers of net marketing returns in plantain marketing

Variables	Linear	Semi-Log	Double Log	Exponential
Constant	709.2958 (0.12)	6.852345 (5.16)	–5.678284 (–0.99)	0.001886 (–0.06)
Age	–6.272809 (–0.06)	–0.084899 (0.36)	–0.2691972 (–0.36)	26300.91 (0.64)
Marketing Experience	0.195021* (3.00)	0.0426468 (1.24)	0.1273448 (0.53)	1.6E+109 (1.71)
Household Size	–93.06977 (–0.22)	10.441525 (0.45)	0.3323607 (0.62)	3.80E–41 (–0.22)
Marital Status	–1035.675 (–0.60)	–0.3703601 (–0.93)	–1.136455 (–1.88)	–1.35E–18 (–2.14)
Education	–16.53843 (–0.07)	–0.0448345 (–0.84)	–0.6288037 (–1.29)	6.57E–08 (–0.07)
Cost of plantain	0.2518676* (4.64)	0.000396* (3.16)	1.24637* (3.36)	1.286426* (4.64)
Marketing Cost	1.102463 (0.52)	0.0002084 (0.42)	0.4239647 (0.77)	3.011576 (0.52)
Access to Credit	–3636.09 (–1.01)	0.5337763 (0.66)	–0.4016171 (–0.51)	1.528008 (0.77)
R^2	0.453	0.346	0.337	0.337
Adjusted R^2	0.367	0.232	0.2379	0.238
F– Ratio	5.27	3.04	3.41	5.09

Source: Field data, 2020

* significant at $p \leq 0.05$ with the figures in parentheses being t-values

reported an inverse relationship between marketing experience and the net marketing returns of watermelon [38].

3.5 Constraints to Plantain Marketing

Results shown in Table 5 elucidated the constraints militating against the marketing of plantain.

Table 5. Constraints to plantain marketing

Constraints	Mean Value	Standard Deviation
Seasonality of the Product	3.53	0.839
Bulkiness	3.45	0.615
Inadequate Finance	3.40	0.124
High Cost of Transportation	3.38	0.114
Spoilage and Breakage	2.93	0.078
Price Fluctuation	2.62	0.880
High Cost of Produce	2.52	0.836
Inadequate Market Information	2.23	0.102
High Market Commission	2.13	0.084
Poor Market Access	1.20	0.717

Source: Field data, 2020

Seasonality of the product, bulkiness, inadequate finance, high costs of transportation, spoilage and breakage, price fluctuations and high cost of the plantain itself were the major challenges confronting all the marketers, as seen in Table 5. This corroborates spoilage of fruits and inadequate capital as major constraints in plantain marketing in Afijio L.G.A of Oyo State, Nigeria [25]. However, poor access to the market, high market commission and inadequate market information were reported as the least severe constraints faced by the marketers. This may perhaps be attributable to the ease of communication and information sharing made possible by the use of mobile phones [39,40] and availability of extension agents [41] in the area.

4. Conclusions and Recommendations

Marketing is an important aspect of the agricultural value chain and it ensures that agricultural products reach the consumers in the place, time and form needed by the end-users. Plantain marketing is a major source of livelihood in southern Nigeria. Marketing of plantain was profitable and viable though inefficient in the study area. The major drivers of the enterprise in the study area were the cost of plantain and marketing experience; thus, a marginal increase in the cost of plantain will lead to an increase in net marketing returns for the plantain marketers and vice versa. This is not unconnected to some marketing challenges faced by the marketers in the study area such as seasonality of plantain, inadequate finance, price fluctuations, high transportation costs and the bulky nature of the commodity, while poor access to the market, high market commission and inadequate market information were the least severe constraints.

There is a need for the provision of basic marketing facilities such as basic infrastructures and credit to enhance marketing efficiency positively. Plantain marketers should be influenced to join or form cooperative societies to help handle some of their issues. Programmes promoting good marketing strategies, proper record keeping and generation of funds that will improve plantain marketing should be organized for the marketers by relevant government or non-government agencies.

Conflict of Interest

There is no conflict of interest.

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