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PROFITABILITY ANALYSIS OF PLANTAIN MARKETING IN KADUNA METROPOLIS, KADUNA STATE NIGERIA

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ABSTRACT
The study was carried out to analyze the profitability of plantain marketing and to examine the structure of plantain market in Kaduna Metropolis. Seventy five plantain marketers were randomly selected from six purposively selected markets. Structural questionnaires were used to collect the data. Descriptive statistics, Cost and return analysis, Herfindahl index, Gross ratio, Operating ratio, Expense structure ratio, Return per capital invested, Benefit cost ratio were used to analyze the data. The study showed that majority (64%) of the plantain marketers were male. 65.3% are within the active age range of 31-60 years. Most respondents are married and educated having a household size of between 1-10 members. Herfindahl index of 0.03 revealed that plantain market tends towards perfect competition. The costs and return analysis showed that purchased cost, transportation, labour and storage cost constitute the variable cost and rent, tools and market charges forms the fixed cost. Furthermore, the finding showed that plantain marketing is profitable with the net return of 14,369 naira per month from the sales of 163 plantains bunches. Analysis of the profit revealed that plantain marketing is a profitable business. The constraint militating against marketing of plantain in the area were also identified to be high transportation cost, seasonal price fluctuation, rapid deterioration in quality/ spoilage, inadequate capital, high initial cost of plantain, poor access road and high market charges. The study therefore recommends plantain marketers should come together to form plantain marketer's cooperative groups from which members could obtain loans at very low interest rates. Also problem of infrastructural facilities such as bad roads should be address by all tiers of governments.

Key words: Plantain marketers, Herfindahl index, plantain bunches

INTRODUCTION
Plantain and modern banana originated from South East Asia and Western pacific region (John and Marchal, 1995). It belongs to the family of "*Musaceae*" and of two types "*Musa acuminata*" (genome AA) and "*Musa balbisiana*" (genome BB). They are one of the world's most important staple food crops for many people in both developed and developing countries. It reaches its greatest importance in parts of East Africa where annual consumption is over 200kg per capita and in West and central African where more than 10 million tons are produced annually and are traded locally (INIBAP, 2001). About 70 million people are estimated to depend on Musa fruits for a large proportion of their daily carbohydrate intake in West and Central Africa (Rowe, 1998). In Nigeria plantains and bananas are both important staple foods for rural and urban consumers and as sources of income for subsistence farm families. The near continuous availability of harvestable bunches in established plantain areas, notably small farms and so-

called kitchen gardens makes it possible for plantain to contribute to an all year round food security or income generation among smallholder producers (Bifarin *et al*., 2010). They rank the fourth most important global food commodity after rice, wheat and maize in terms of gross value of production (INIBAP, 1992; FAO, 2001).

Nigeria is the largest producer of plantain in West Africa, with an annual production of 2.4 million metric tons, mostly obtained from the Southern states (Ogazi, 1996). Commercial production of plantain has been reported to be technically and economically feasible in Ogun, Ondo, Oyo, Edo, Delta, Cross River, Akwa Ibom and Rivers states, while it is feasible only under irrigation in Kwara, Niger, Sokoto, Benue, Plateau, Bauchi, Borno and Gongola states (Bifarin *et al*., 2010). In Nigeria, four main types of plantain are available with distributions strictly based on their bunch characteristics. There are, French type, false horn type, French horn type and horn type (Swennen and Ortiz, 1997). The false horn type is the most widely distributed because of its ability to tolerate poor soil conditions. Plantain is important in diet of many Nigeria families. In the urban areas, it is normally eaten in convenient forms like "Dodo (fried ripe pulp), chip (fried unripe pulp) and as plantain flour (Akinwumi, 1999 and Adetunji and Adesiyan, 2008). This plantain flour has an advantage over other starchy foods because it contains protein, mineral and vitamins. Medicinally plantain can be used to cure some ailments; like sore throats, tonsillitis, diarrhoea and vomiting. Due to its high nutrients, plantain is used in the production of Soymusa, which can be used in the treatment of kwashiorkor (Idachaba, 1995).

A lot of intervention on *Musa* spp. has been based on its production technology while its marketing has been fairly neglected. Since plantain is a perishable food crop, increasing production without corresponding increase in marketing may result to wastages of resources. Idachaba (2000) claims that it is not sufficient for policy makers to concentrate on solving production problems without reference to their marketing problems because even thought actual production may be adequate, marketable and marketed surplus may be inadequate and unreliable. However, the issues of neglecting marketing system was first observed by Mellor (1992) who postulated that marketing system has been totally neglected in the literature on economic development. Also, Njoku and Nweke (1996) later agreed that the marketing condition changed because the sector was ignored.

Plantain marketing involves the role of middlemen in passing plantain from the farms to the markets. Therefore, the roles of markets cannot be over emphasized because production centers are fragmented and mostly in small scale. It is faced by a lot of marketing problems and these problems determine whether production can be expanded. Production problems can be overcomed through introducing new production technology and efficient marketing system and this can only be realistic by understanding marketing system. As a seasonal crop with relatively short shelf life, plantain is available for a limited time and post harvest losses are high. The perishable nature of plantain makes processing a vital link in the marketing process. Researchers held that underplaying marketing in economic development left people on the platform of malnutrition as a result of over ripening of produce (Plantain) which lead to loss or waste. Plantain is a seasonal crop with relative short shelf life hence, it is available for a limited period and post harvest losses are very high. These situations necessitate a scientific survey of its marketing system especially in areas where commercial production of plantain are not technically and economically feasible unless with irrigation. However, this study is aimed at providing answers to the following research questions: What are the socio-economic characteristics of plantain marketers; what is the structure of plantain market in the study area;

what are the costs incurred and return generated in plantain marketing; is plantain marketing a profitable business; what are the constraints militating against plantain marketing?

Objectives of the study

The broad objective of the study is to carry out an economic analysis of plantain marketing in Kaduna metropolis. The specific objectives are to:

i. identify the socio-economic characteristics of the respondents.
ii. describe plantain market structure in the study area
iii. evaluate costs and return to plantain marketing in the study area
iv. determine the profitability of plantain marketing
v. identify the constraints facing plantain marketing in the study area.

METHODOLOGY

Study Area: Kaduna metropolis is made up of four Local Government Areas, namely; Kaduna north, Kaduna south, Igabi and Chikun local government areas. Kaduna state lies between latitude 10^0 37^1 N and longitude 7^0 17' E and its coordinates is 10^0 20' N and 70^0 45' E (Wikipedia). It has a population of about 6,066,512 people according to 2006 census figure and is the third largest in the federation after Lagos and Kano states (NPC, 2006). According to Wikipedia, Kaduna state has a total land area of about 46,053 square kilometer and the density is about 131.7 square Kilometre (341.2 square metre).. The metropolis is a commercial and industrial centre of Nigeria, the city has many factories such as textile, beverages, furniture, etc. It is a rail and road junction, thus, a trade centre for the surrounding agricultural areas. The city was founded by the British in 1913 and became the capital on 25th May, 1967 of Nigeria former Northern region. It got her name after the Kaduna river which flows through the centre of the state and on which the city lies. (Wikipedia). The area is marked with two distinct seasons of wet and dry. The major ethnic groups in the city are the Hausas, Gwaris, Katafs, Gbagijs and Jaba form the majority of the inhabitants of the area. Others include the Fulanis, Tiv, Idoma, Yoruba and Ibos. The mean annual rainfall shows a marked decrease from south to the north 152-635mm.

Sampling Techniques and Data Collection; The following six markets were purposively selected based on high population of plantain marketers: Kaduna North Central market, Kaduna South Station market, Bakin Dogo, Kawo market, Kasuwa Mondi market and Sabo market. Based on the volume of trade involved and population of traders, fifteen plantain marketers were randomly selected in each of Kaduna North Central market, Kaduna South Station market, Bakin Dogo, while ten marketers were selected in each of Kawo, Kasuwa Mondi and Sabo market. Hence, a sample size of seventy five marketers was used for this study. Interviews were conducted with the use of well structured questionnaire administered to 75 plantain marketers.

Analytical Tools: Data were analyzed using descriptive statistics such as tables, percentages, frequency distribution, and arithmetic mean to analyzed objectives i, and iv. Objective iii was achieved by computing Herfindahl index for the market and drawing inference from the result.

Herfindahl index (HI) = $\sum Si^2$

Where Si= Market share for respondent i, calculated as Si= qi/q

Where qi= bunches of plantain sold per month by respondent i

q= total number of bunches sold per month by all respondents

Cost and return analysis was used to achieved objective iv.

Costs and Return Analysis in Naira
Total Marketing Cost (TMC) = Total Variable Cost (TVC) + Total Fixed Cost (TFC)
Total Revenue (TR) or Gross income (GI)= Price per bunch (P_b) * Quantity of bunches sold (Q_b)
Net return or income (Λ) =Total Revenue (TR) - Total Cost (TC)

Profitability Analysis: Profitability of plantain marketing was derived by analyzing the performances of the business with Gross Ratio, Operating Ratio (OP), Expense Structure Ratio and Return per Capital Invested (RPCI) as well as Benefit Cost Ratio. The expressions for these measures were as follow:
The Gross Ratio (GR) is given as Total Marketing Cost or Expense (TMC or E) divided by Gross Income (GI). i e GR = TMC ÷ G I. This shows the proportion of the G.I. that goes into the total costs during the marketing period.
Operating Ratio (OR) is given as Total Operating cost or Total Variable Cost of Marketing (TVCM) divided by Gross Income (GI) i e OR= TVCM ÷GI. The ratio indicates the proportion of the G.I that goes to pay for the operating costs. It is directly related to the variable input usage (Olukosi and Erhabor, 2008).
Expense Structure Ratio (ESR): is given as total fixed cost divided by total variable cost of marketing (TFC/TVCM). It indicates the proportion of the cost of marketing that form the fixed cost component.
Return per Capital Invested (RPCI) is given as Net return (or Net income) divided by total marketing cost (TMC). i.e RPCI = NI ÷ TMC. This indicates the amount of money returns to the investor for every naira invested on a business.
Benefit-Cost Ratio (BCR): This is given as benefit (Gross Income) divided by total marketing cost i.e GI ÷ TMC. The ratio shows whether a business is worth investing in or not. That is, if the ratio is greater than 1, it is profitable and otherwise if it is less than unity.

Results and Discussion
Socio-economic characteristics: The socio-economic characteristics of the respondents as shown in table 1 revealed that 64% are male while 36% are female. This implies that the marketing of plantain in the study area is not gender sensitive. Though there are more male than female which indicates that men were more into marketing of plantain than female in the study area. This could be due to the fact that majority of the respondents are Muslims (62.67%) where the religion restrict women only to house hold jobs. The practice of ‘‘purdah’’ (women seclusion) is a common practice in the study area. Binta and Undiandeye, (2005) observed that men dominated the marketing of cowpea in Maiduguri because majority of them are Muslims Majority of the respondents (65.3%) are within the age range of 31-60 years. This indicates that most of the respondents were within the age defined by FAO (1992) as economically productive in population (16-64 years). The table further revealed that 60% of the marketers are married while 25.3% are single. The widowed, divorced and separated accounted for 14.7%. This shows that marital status is not a barrier to involvement in the business. On the issue of household size, 41.3% had between 1-5 household members, 34.7% claimed to have between 6-10 members, 20% and 4% had between 11-15 and 16-21 household members respectively. This revealed that respondents with large, medium and small household size were found in plantain marketing. In term of educational level, 37.3% and 34.7% had secondary and primary education while 26.7%

had tertiary education. Only 1.3% had quranic education. Experience in plantain marketing is a measure of the period an individual has been involved in the business/ trading. Majority of the respondents (94.7%) had gained reasonable experience having been involved in the trading for less than 10 years while 5.3% had between 11 to 20 years. According to Aasa (2006), in his study on the analysis of the factors affecting the marketing and demand for maize seed in Kaduna state pointed out that experience influences individual's perception and understanding of the managerial requirements and sales of goods. In other words, experience would help the traders on how best to manage their plantain marketing more efficiently. More than half (54.7%) of the respondents sourced for capital from personal savings. 33.3% and 12% claimed to obtained capital from friends and cooperative. This implies that the capital base in running the business was low.

Table 1: Socioeconomic Characteristics of Respondents

Socio economics characteristics	Frequency	Percentage
Sex		
Male	48	64
Female	27	36
Age		
≤ 30	23	30.7
31-40	25	33.3
41-50	20	26.7
51-60	4	5.3
> 60	3	4
Marital status		
Single	19	25.3
Married	45	60
Divorced	2	2.7
Separated	2	2.7
Widowed	7	9.3
Household size		
1-5	31	41.3
6-10	26	34.7
11-15	15	20
16-21	3	4
Level of education		
Primary	26	34.7
Secondary	28	37.3
Tertiary	20	26.7
Quranic	1	1.3
Years of marketing experience		
1-10	71	94.7
11-20	4	5.3
Source of capital		
Personal savings	41	54.7
Cooperatives	9	12
Friends	25	33.3

Religion		
Muslims	47	62.67
Christianity	28	37.33

Source: Field survey, 2012

Market structure of plantain: The Herfindahl index was used to determine the structure of plantain market in the study area. The highest value obtainable here is 1. A very low herfindahl index of 0.013 was obtained. The low herfindahl index revealed that the concentration ratio for plantain marketers was very low, thus the market structure of plantain tends towards perfect competition, which is characterized by large number of buyers and sellers, homogeneous product, no barrier to entry into the business, perfect mobility of resources and perfect knowledge of all relevant information.

Marketing costs: Table 2 showed the average variable, fixed and total marketing cost incurred in marketing of plantain. The total variable cost was ₦150, 426 and total fixed cost was ₦4575. Apart from purchased cost which accounted for 84.3%, transportation cost constitutes the highest variable cost incurred in the marketing of plantain by the respondents. Aasa *et al*, (2011) found that transportation cost constitute the highest marketing cost in the marketing of Irish potato in Kaduna metropolis. Olukosi and Isitor (1990), Ayoola, *et.al* (2010), in their separate studies, pointed out that transportation cost constitutes the highest component of total variable cost of marketing agricultural produces. Similar observation was made by Ahmed & Omolehin, (1999). This was followed by labour and storage costs which constitute 5% and 2.4% of the variable cost. In terms of fixed cost of marketing, rent constitutes the highest percentage of 72.77% while tools and market charges accounted for 16.66% and 10.58% respectively.

Table 2: Total marketing cost incurred in marketing of plantain per month

Variable items	Cost(₦)	Percentage %	Fixed items	Cost (₦)	Percentage %
Labour	7,500	5	Tools	762	16.66
Transportation	12,500	8.3	Market charges	484	10.58
Storage	3616	2.4	Cost of rent	3329	72.77
Purchased cost	126,810	84.3			
Total variable cost	150,426		Total fixed cost	4575	
Total marketing cost (TMC) = Total Variable Cost (TVC) + Total Fixed Cost (TFV)= 155001					

Source: Field survey, 2012

Gross income: Table 3 showed the revenue generated from the sale of bunches of plantain. From the table, 163 bunches of plantain was sold per month. This comprises of 62 big, 55 medium and 48 small at the rate of ₦890, ₦950, and ₦1200 respectively. The total revenue generated was ₦169, 370 and the net profit obtained per respondents per month was ₦14, 369

Profitability analysis: Five measures of profitability analysis were used to determine the profitability of plantain marketing in the study area. This includes Gross Ratio (GR) Operating Ratio (OR), Expense Structure Ratio (ESR), Return per Capital Invested (RPCI), and Benefit cost ratio as presented in table 5. Gross ratio was 0.92, this shows that the total marketing cost was 92% of the gross income or total revenue; also it implied that from every ₦100 returns to the enterprise ₦92 is been spent. According to Olukosi and Erhabor, (2008), the lower the ratio the higher the return per naira invested. Also, operating ratio of 0.89 indicates that 89% of the gross income (Total revenue) goes into the variable inputs used in the plantain marketing in the study area. Expense structure ratio of 0.03 was obtained, indicating that about 3% of the cost of production was made of fixed cost component. This made the business worthwhile since increase in the production with the variable cost will increase the total revenue leaving fixed cost unchanged. The financial viability of plantain marketing was determined using the return per capital invested and Benefit- cost ratio. The value of 0.09 was obtained for RPCI. This implies that for every additional naira invested in the enterprise, 9 kobo gain was realized. The analysis of benefit-cost ratio gave a value of 1.09 (BCR>1). This shows that the marketing of plantain is a viable business in the study area.

Table 3: Gross income generated from bunches of plantain sold per month

Bunches sizes	No sold	Selling price	Revenue (₦)
Small	48	890	42,720
Medium	55	950	52,250
Big	62	1200	74,400
Total	163	-	169,370
Net Income= Gross income-Total Marketing Cost= 169,370- 155,001= ₦14,369			

Source: Field survey, 2012

Table 4: Profitability analysis of Plantain Marketing

S/n	**Profitability measure**	**Ratio**
1	Gross Ratio (GR)	0.92
2	Operating Ratio (OR)	0.89
3	Expense Structure Ratio (ESR)	0.03
4	Return per Capital Invested (RPCI)	0.09
5	Benefit Cost Ratio (BCR)	1.09

Source: Field survey, 2012

Table 5: Constraints of plantain marketing in the study area.

Constraints	**Frequency**	**Percentage %**
Seasonal price fluctuation	15	20
Inadequate capital	9	12
High transportation cost	20	26.7
Rapid deterioration in quality/spoilage	15	20
High initial purchasing price	8	10.7
Poor access road	5	6.7
High market charges	3	4
Total	75	100

Source: Field survey, 2012

Constraints of Plantain Marketing in Kaduna Metropolis

The constraints militating against plantain marketing in the study area as presented in table 5 varies from high transportation cost, seasonal price fluctuation, rapid deterioration in quality/ spoilage, inadequate capital, high initial cost of plantain, poor access road and high market charges. High transportation cost of 26.7% constitutes the major constraint to the respondents and formed the highest proportion of the total marketing cost. This is due to long distance travelled to the producing states since Kaduna is not a natural ecology for plantain production. Similar observation was made by Ahmed & Omolehin, (1999). Another reason might be as a result of the bulky nature with which the commodity is usually transported and poor access roads which accounted for 6.7% of the constraint by the respondents. Seasonal price fluctuation and rapid deterioration in quality/ spoilage accounted for equal percentages of 20%. Seasonal price fluctuation may be due to surplus or shortage of the commodity during the on and off season while inefficient handling when on-loading and/ or off-loading often lead to bruising and spoilage. Also overripe plantain deteriorates and spoiled easily than the unripe ones. This makes the sellers to sell the commodity at a give-away, thereby spreading the cost of spoilage on the good ones. 11.7% of the respondents had the problem of inadequate capital; this hinders the expansion of their business. High initial purchasing cost constituted 10.7% of the problem faced by the respondents. This is highly pronounced during the off season when the commodity is scarce. This finding agreed with that of other researchers, such as Ahmed and Omolehin, (1999). This affects the sales price of plantain and consequently the consumers' purchasing power. High market charges formed 4% of the constraint encountered by the marketers in marketing plantain in the study area.

CONCLUSION

The findings of the study revealed that plantain market is a perfect competitive market, there is no restriction into the business, and is profitable with moderate net income and benefit cost ratio of greater than 1 (BCR>1). However, the marketing was faced with a lot of constraints such as high transportation cost, seasonal price fluctuation, rapid deterioration in quality/ spoilage, inadequate capital, high initial cost of plantain, poor access road and high market charges. Finally, plantain marketing in the study area could be more profitable by finding lasting solutions to the various constraints faced by its marketing.

RECOMMENDATIONS

Based on the research findings, the following are recommended

1. Problem of infrastructural facilities such as bad roads should be address by all tiers of governments. Bad road should be renovated and new ones constructed especially those that link the rural areas with urban areas. This will help in getting the produce to the market places in good quality. It will bring about a reduction in transportation cost and hence the cost of marketing.
2. The marketers should come together to form plantain marketer's cooperative groups from which members could obtain loans at very low interest rates to finance and expand their business.
3. Proper handling during on-loading and/ or off-loading as well as good storage facilities will reduce the rapid deterioration in quality and spoilage of the plantain and thereby increasing.
4. Development and adoption of better techniques that will simplify processing to reduce the spoilage of overripe plantain and bring about value addition is needful.

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