Potentials of Plantain Value Addition in Improving Rural Households' Income in Ekiti State, Nigeria.

Abstract

Aim: This study examined the potential of value addition to Plantain in improving rural households' income in Ekiti State, Nigeria. The study investigated the socio-economic variables of plantain processors, identified the value-added products, factors influencing plantain value addition, the profitability and the overall contributions of value addition of Plantain to rural households' income.

Methodology: A multi-stage sampling technique was used coupled with a well-structured questionnaire to elicit information from 120 respondents. Data collected were analyzed using descriptive statistics, Relative Importance Index, and partial farm budget analysis.

Results: The study revealed that plantain processors were mainly middle-aged (mean age-42 years), primarily female (83%), educated, and married (78 per cent), with a mean household size of 6 people. The most common forms of value added to Plantain are chips, flour, roasted Plantain (boli), fried Plantain (dodo), and flakes. In order of their relative importance index, the motivating factors for value addition to Plantain are unemployment, peer influence, regular income, drive for self-employment, social relevance, self-accomplishments and satisfaction. The study revealed the average total variable cost of ₦148,200.00; for plantain chips, ₦99,050.00 for fried Plantain, ₦82,000.00 for plantain flour and ₦55,600.00 for roasted Plantain. The total revenue of ₦205,000.00 for plantain chips, ₦151,600.00 for fried Plantain, ₦92,000.00 for plantain flour and ₦60,000.00 for roasted Plantain. The Net profit of ₦96,100.00 for plantain chips, ₦91,850.00 for fried Plantain, ₦37,000.00 for plantain flour and ₦14,900.00 for roasted Plantain. The Rate of returns for plantain chips is 0.65, followed by 0.93 for fried Plantain, 0.45 for plantain flour and 0.27 for roasted Plantain. These indicate that for every N1.00 invested in Plantain value-added products, 65 kobo, 93 kobo, 45 kobo and 27 kobo are gained for plantain chips, fried Plantain, plantain flour and roasted Plantain, respectively. The cost-benefit ratio is 1.38, 1.53, 1.12, and 1.08 for plantain chips, fried Plantain, plantain flour and roasted Plantain, respectively.

Conclusion: Plantain production is a profitable enterprise with small capital investment and its value addition contributes significantly to household income in Ekiti State.

Keywords*: Households, Plantain, profitability, value addition*

1. INTRODUCTION

Plantain is one of the most important staple foods for both rural and urban populace. It is a horticultural crop, and also one of the ten most important food security crops that feed the world[1,2]. Its scientific name is Musa paradiasiaca, while herbaceous plants in genus Musa. It is classified formally as Musa balbisiana or hybrids Musa acuminata balbisiana (AAB Group), depending on their genetic constitution[3]. Plantain is a versatile food in the kitchen as well as a raw material for many popular delicacies. It is also a source of carbohydrates and iron, and contained about 35 percent CHO, 0.2 to 0.5 percent fats, 1.2 percent protein, and 0.8 percent ash[4,5]. Plantains have the potential to contribute to the national food security and decreasing rural poverty by improving households' income[6]. According to Olumba and Onunka [7], plantain production enterprises in West Africa have great prospects in the area of employment generation, contributions to national income and gross domestic product, poverty alleviation, economic and industrial growth and rural development. The fruit is cooked in different forms and served as food in many households. Its products in the chef include fried ripe pulp, chip or fried unripe pulp and plantain flour. It could also be consumed as boiled, pounded, roasted, baked, or sliced and fried into chips, overripe plantain is processed into beer or sliced with pepper, fried with oil and served as snacks. The unripe plantain is traditionally processed into flour which is mixed with boiling water to prepare amala[8,3]. Plantain is more advantageous over other starchy foods because it contains protein, mineral and vitamins. It could be used in the treatment of sore throat, tonsillitis diarrhea, while the unripe plantain is used to treat diabetic and kwashiorkor due to its richness in health promoting bioactive phytochemical[3,9]. Research has shown that Nigeria is one of the major producers of plantain in the world. It was ranked first in Africa and

fifth in the world with an estimated production of about 2,722,000 metric tons in 2011[10]. In view of the significant contributions of plantain to the economic development and food security of both rural and urban households in Nigeria, it is imperative to assess the value added to plantain. Most studies on plantain in Nigeria have been on production, agronomy, processing, post-harvest losses and market efficiency[11,12].

Value addition is the act or activities involved to create additional value, changing or to transform raw agricultural commodities at a particular stage of production from input suppliers to consumer ready-made food products. It includes local processing, packaging, cooling, drying, extracting or any other types of the process aimed at improving the value of raw agricultural produce. Value addition has been identified as a pathway for farmers out of poverty. Yadav, Singh, Singh and Kumar [13]asserted that plantain value addition entails changing or transforming plantain fruits from its original state to a more valuable state preferred in the market. Plantain value added product serves as food and important raw materials for livestock feed, confectionary, bakery, and pharmaceutical industry[14]. It could also be processed into food/foodstuffs such as breakfast cereals, baby food, soymusa, flour, chips, and snacks food[15]. Farmers benefit more from an increase in the price of agricultural produce as a result of value addition, and opportunities exist by improving the shelf life of agricultural commodities, farmers' income, standard of living and generation of employment and to link up with market structure and processors[16].

It is in this background that the study was carried out to examine the potentials of plantain value addition to improving the rural households' income in Ekiti State. The specific aims include describing the socio-economic characteristics of the respondents, identify the value added products, motivating factors, and cost and returns analysis of plantain value added products.

2.0. Materials and Methods

2.1. Study area

This research was conducted in Ekiti State. Between longitudes 4°451 and 6°451 east of the Greenwich meridian and latitudes 6°151 and 8°51 north of the equator, the state sits within the tropics. The state has a typical tropical climate with two distinct seasons: the wet season from April to October and the dry season from November to March. The state shares a southern border with Kwara and Kogi, an eastern border with Ondo, and a western border with Osun. The state has a population of 2,384,212, which is approximately 1.7% of the total U.S. population, and a land area of 6,353 km2 (NBS, 2008; NPC, 2006). The average annual precipitation runs from 2000 to 2400 millimeters, the average annual temperature ranges from 200 to 270 degrees Celsius, and the average relative humidity is 60%. The state contains sixteen (16) Local Government Areas. Due to the increased production and demand for plantain in an effort to save people from starvation, poverty, and unemployment, Ekiti State was chosen for the study.

2.2. Sampling technique: The sample for the survey was drawn using a multi-stage sampling method. In the first step, six Local Government Areas were chosen at random from the state. In the second round, two communities were chosen at random from each of the nominated Local Government Areas. In the third step, ten respondents were selected at random from each neighborhood. Thus, 120 individuals were chosen for the study and interviewed.

2.3. Methods of data analysis: Utilizing descriptive statistics such as frequency counts, mean, and percentage, the socioeconomic characteristics of the respondents and the identified value-added items were described. Using the Relative Importance Index (RII), the driving factors were ranked according to their importance indices. The Total Revenue, Net farm Profit, Gross Margin, Rate of Returns, and Cost-Benefit Ratio were also evaluated using a partial budget analysis.

2.3.1. Relative Importance Index (RII): This aids in finding the contribution that a particular variable makes to the prediction of a criterion variable both by itself and in combination with other variables.

The Relative Importance Index (RII), = $\sum W/A*N$

RII = Sum of Weights (W1+W2+----WN) / (A x N)

Where;

W = Weights assigned to each factor by the respondents, and it ranges from 1 to 3 where '1' is less important, and '3' is extremely important

A = highest weight (i.e. 3 in this case), and

N = the total number of respondents (i.e. 120).
Weighted score = $\frac{\text{No of Ax 3 + No of U x 2 + No of D x 1}}{\text{A x N}}$
A = Agree, U = Undecided and D = Disagree

2.3.2. Partial Farm Budgeting Analysis

TC **=** Total Fixed Cost (TFC) **+** Total Variable Cost (TVC)
Net Farm Profit **=** TR – TC
ROR **=** Net Profit/TC
GR = TC/RC
BCR = TR/TC
TC = Total cost
TR = Total Revenue
ROR = Rate of Returns
BCR = Benefit Cost Ratio

3.0. Results and Discussion

3.1. Socio-economic characteristics of the respondents

The result in Table 1 shows the socio-economic characteristics of the respondents. The study revealed that 50.83 percent of the respondents were within the age range of 31–40 years, indicating that the majority of the respondents were predominantly middle-aged with a mean age of 42 years. Most (78.33%) of them were married while 21.67 percent were unmarried indicating that it is a good source of income for sustaining the well-being of the households and probably to engage family labour as well as a reliable source of income for family to meet their financial obligations. About 82.50 percent were female while 17.50 percent were male which shows that female were actively involved in the processing of plantain than male and this could be due to cultural belief that processing of agricultural produce is mainly the responsibilities of women. More than half (52.50 percent) of the respondents have a household size between the range of 4 and 6 persons and average household size of 6 people while the respondents cut across the three religion practices in the country. The mean years of plantain value addition experience was 17 years, and this indicated that the enterprise is sustainable. Less than half (43.34 %) of the respondents had a tertiary education while 30.83 percent had secondary education, 15.83 percent had primary education and 10.00 percent had no formal education. It could be affirmed that most of the respondents are literate. Their literacy level is expected to influence their ability to seek and imbibe relevant information on value addition to plantain. More than half, (56.50 percent) of the respondents realized above the average monthly income of ₦146,550.00 from value added plantain products and this indicated that plantain value addition is a viable enterprise.

Table 1. Socio-economic characteristics of the respondents

Variables	Frequency	Percentage (%)	Mean
Age (Years)			
Less than 21	14	11.67	
21 – 30	23	19.17	
31 – 40	61	50.83	**42**
41 – 50	18	15.00	
Above 50	4	3.33	
Sex			
Male	21	17.50	
Female	99	82.50	
Marital Status			
Unmarried	26	21.67	
Married	94	78.33	
Religion			
Christianity	71	59.17	
Islam	46	38.33	
African Traditional Religion	3	2.50	
Educational Qualification			

No Formal Education	12	10.00	
Primary Education	19	15.83	
Secondary Education	37	30.83	
Tertiary Education	52	43.34	
Monthly income (₦)			
Less than 51,000	17	14.17	
51,000 – 100,000	22	18.33	
101,000 – 150,000	20	16.67	**146,550.00**
151,000 – 200,000	22	18.33	
More than 200,000	39	32.50	
Household Size			
1-3	34	28.33	
4-6	63	52.50	**6**
Above 6	23	19.17	
Experience (Years)			
1 – 10	47	39.17	
11 – 20	33	27.50	**17**
21 – 30	28	23.33	
More than 30	12	10.00	

Source: Field Survey, 2022.

3.2. Identification of value-added products

The results in Figure 1 reveal the value added products of plantain in the study area. The most common value added products are plantain chips, plantain flour, roasted plantain (boli), pounded plantain, fried plantain (dodo), and plantain flakes. About 41.27 percent of the respondents were involved in plantain chips production. The high involvement of the respondents in plantain chip production could be due to the market demand and preservation qualities. Plantain chips are cut into slices and fried with vegetable oil, simmered and packaged in nylon or plastic sachets, which can be stored for six to seven months in a room temperature (Adeniji, 2005; Dzomeku, *et al.*, 2006; Asogwa *et al.,* 2021). Also, 22.13% of the respondents were involved in the production of plantain flour, due to its demand and consumption for the control of diabetes and other health benefits. Similarly, 13.42 percent of the respondents were involved in roasted plantain which are sell by the roadside, 11.03 percent indicated that they used plantain for pounding and it is mainly for family consumption, 10.13 percent indicated that they produce fried plantain (dodo) to avoid wastage of the ripe plantain and also to satisfy the desire of their kids, while 2.02% indicated that they were involved in the production of plantain flakes for their family consumption.

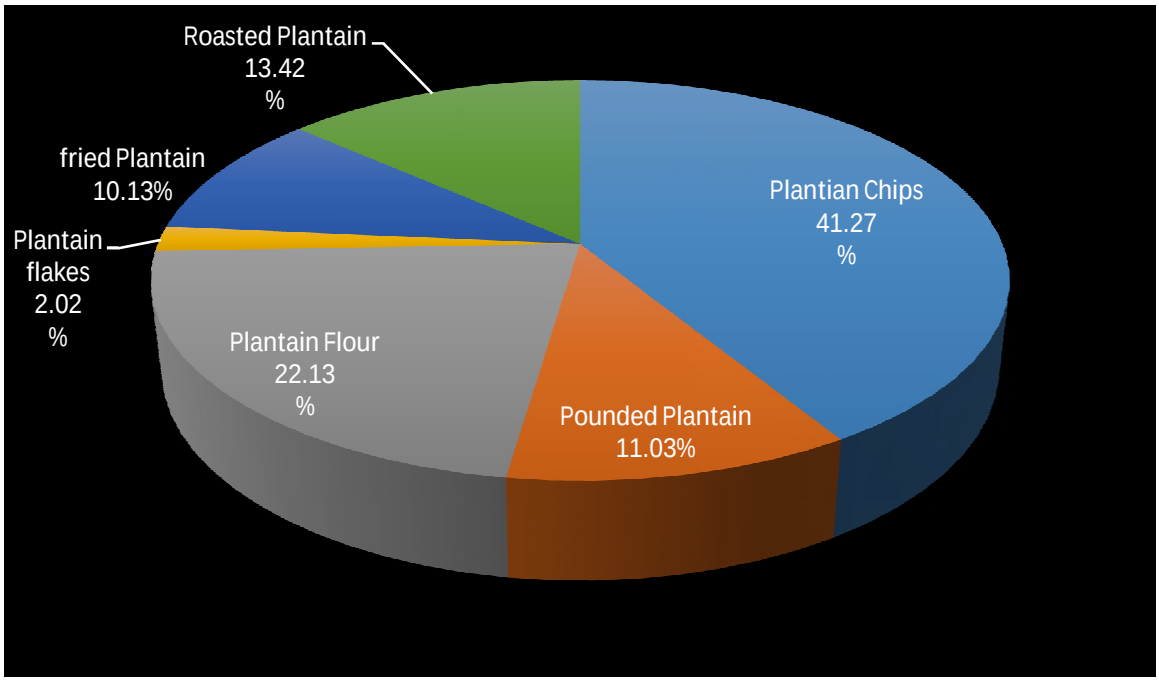

Figure 1. Value added products

3.3. Motivating factors for Value-added Plantain

The results of the analysis in Table 2 reveals the rating of importance of the motivating factors of the respondents, starting from the most important to the least in order of ranking. The mean score is 3 points and this is used as the benchmark. The motivating factors were subjected into ten variables, whereby efforts were made to classify the variables into their level of significance or importance, using the Relative Importance Index (Table 2). Any variable lesser than the mean score (3 point) are less important while the variables found equal or above the mean score are regarded as very important and they are ranked according to the relative important indices. Eleven of all the variables were relevant or significant while only one of the twelfth variables was not significant. Most of the respondents indicated that plantain value addition provides employment opportunities ($\bar{x}$ = 3.78) and this was accorded the first position. It was followed by reduction of post-harvest losses ($\bar{x}$ = 3.73) and the increase in farm income gives satisfaction due to reduction of post-harvest losses ($\bar{x}$ = 3.53) and constant income ($\bar{x}$ = 3.53), reduces the cost of transportation due to reduction in bulkiness after value addition ($\bar{x}$ = 3.47), un-seasonality of consumption of value-added plantain ($\bar{x}$ = 3.47), encouragement by a friend involve in the processing of plantain chips ($\bar{x}$ = 3.36), improve the quality and taste of the product ($\bar{x}$ = 3.18), it attracts more demand for the products ($\bar{x}$ = 3.10), and these were ranked from 1st to 11th position, respectively. The involvement of additional cost ($\bar{x}$ = 2.77) to the processing of plantain value addition was the only variable that is less important and it is accorded the 12th position.

Table 2. Motivating factors

S/No	Motivating Statement	Mean	Relative Important Index	Rank
1.	It provides employment opportunity	3.78	0.96	1st
2.	It reduces post- harvest losses	3.73	0.95	3rd
3.	It leads to increase in income	3.53	0.91	5th
4.	It increases the demand for the products	3.10	0.82	11th
5.	Reduced cost of transportation	3.47	0.89	6th
6.	Increase quality and taste of the product	3.13	0.83	10th
7.	I was encouraged by my friends or peer influence	3.36	0.87	8th
8.	It involves additional cost	2.77	0.75	12th
9.	It gives me satisfaction due to reduction of post-harvest losses and constant income	3.53	0.91	3rd

10.	It helps me to accomplish my dream because it serves as a stepping stone for me.	3.18	0.84	9th
11.	Un-seasonality of consumption of value-added plantain	3.47	0.89	6th
12.	A substitute for more expensive food materials	2.78	0.96	1st

Source: Field survey, 2022.

3.4. Cost and returns of value addition to plantain production

The results in Table 3 show the estimate of cost and return analysis made from value addition to plantain production in Ekiti State using the average cost (fixed cost and variable cost) and the income generated by each of the respondents per month. The total cost incurred on plantain value added products in the study area are ₦148,200.00; ₦99,050.00; ₦82,000.00, ₦55,600.00 for plantain chips, fried plantain, plantain flour and roasted plantain respectively. The total revenue are ₦205,000.00; ₦151,600.00; ₦92,000.00; ₦60,000.00 for plantain chips, fried plantain, plantain flour and roasted plantain respectively. The Net profit for plantain chips is ₦96,100.00, follow by fried plantain (₦91,850.00), plantain flour (₦37,000.00) and roasted plantain (₦14,900.00) which depicts the difference between the total revenue and total cost for each of the value added products. The Gross returns for plantain chips was 0.72, follow by fried plantain (0.65), plantain flour (0.89) and roasted plantain (0.93).

Furthermore, the rate of returns for plantain chip was 0.65, follow by fried plantain (0.93), plantain flour (0.45) and roasted plantain (0.27) indicating that for every ₦1.00 invested in plantain processing, 65 kobo is been gained in plantain chip production, while 93 kobo is been gained in fried plantain, and 45 kobo is been gained in plantain flour while 27 kobo is been gained in roasted plantain production. The benefit cost ratio for plantain chip was 1.38, follow by fried plantain (1.53), roasted plantain (1.12) and plantain flour (1.08). According to rule of thumb, any benefit cost ratio greater than one, equal to one or less than one indicate profit, break-even or loss, respectively. Since, the ratio of these value added product is greater than 1.0, it shows that it is profitable even with little capital investment. This is similar to the findings of Ekunwe and Ajayi (2010) that plantain enterprise is profitable and recommended as a viable enterprise for anyone who wants to go into the venture. Hence, this study shows that value addition to plantain contributes to household's income.

Table 3. Cost and Returns of Plantain Value-Added Products

	Plantain Chips	Fried Plantain	Plantain Flour	Roasted Plantain
Fixed cost	**₦**	**₦**	**₦**	**₦**
Fryer	4,500	4,500	-	-
Charcoal	-	-	-	5,000
Sacks	-	-	3,500	1,500
Frying pan	8,500	8,500	-	-
Knife	1,000	1,000	1,000	1,000
Long spoon	2,800	2,800	-	-
Slicer	2,500	2,500	2,500	-
Bowl	3,000	3,000	3,000	3,000
Sealer	17,000	17,000	-	-
Total Fixed Cost	**39,300**	**39,300**	**27,000**	**10,500**
Variable Cost				
Vegetable oil	18,000	9,000	-	-
Ginger	500	250	-	-
Sugar	500	250	-	-
Salt	300	150	-	-
Plantain	54,000	28,000	65,000	45,000
Matches	100	100	-	100
Nylon	15,000	8,000	-	-
Sticker	7,000	1,500	-	-
Electricity bill	3,500	2,500	-	-
Labour	10,000	10,000	-	-
Total variable cost	**108,900**	**59,750**	**65,000**	**45,100**
Total revenue	205,000	151,600	92,000	60,000
Total Cost (FC + VC)	148,200	99,050	82,000	55,600
Net Profit (TR - VC)	96,100	91,850	37,000	14,900
Gross Return (TC/TR)	0.72	0.65	0.89	0.93
Benefit Cost Ratio (TR/TC)	1.38	1.53	1.12	1.08
Rate of Returns (Net profit/TC)	0.65	0.93	0.45	0.27

Source: Field survey, 2022.

4.0. Conclusion

This study investigated the potential of plantain value addition to increase the income of rural households in Ekiti State, Nigeria. It was found that adding value to plantain production in Ekiti State provides employment opportunity for unemployed youths, reduces post-harvest losses, leads to an increase in income, increases demand for the products, reduces transportation costs, increases quality and taste of the product, involves additional cost, gives satisfaction, and helps achieve a dream of being self-employed. It was observed that plantain value addition it's a profitable business with small capital investment. Hence, adding value to plantain increases household income and serves a viable route out of poverty for farmers.

5.0. Recommendation

The study suggests that youths and unemployed graduates should be sensitized and encouraged towards partaking in adding values to plantain as a means of employment. Also, people aspiring to increase their production could come together in form of cooperatives for joint loan accessment. Good road network should be made available to link the rural populace with the urban populace to ease the transportation and also reduce the cost of transportation and eventually cost of production.

Conflict of Interest

There is no conflict of interest.

Authors' Contributions

This research work was carried out in collaboration among the two authors. Thus, the two authors read and approved the final manuscript for publication.

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