Profitability of Investment in Plantain Value Chain in Osun State, Nigeria

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Abstract: Profit is the driving force for any enterprises to thrive well, because it encourages more investment into an enterprise. One of the major barriers to investing in plantain value chain is inadequate information on return to investment. Thus, this paper investigated profitability of investors along plantain value chain in Osun state. A multistage sampling procedure was used to elicit information from 100 respondents for the study. Data were analysed using descriptive analysis, budgetary analysis, and multiple regression analysis. Descriptive statistics reveal that average age was 52.2 (±11.19) years for plantain farmers, 41.8 (±10.78) years for processors and marketers 33.42 (±11.99). While, average farming experience was 26.9 (±10.88) years for plantain farmers, 12.47 (±10.78) years for processors and marketers 5.84 (±19.12). About 6.7% farmers, 15.6% processors and 13.2% marketers had access to credit facilities. The budgetary analysis showed that benefit-cost ratios were $1.38, $1.30 and $1.19 for the farmers, processors and marketers, respectively. Multiple regression estimates revealed that insecticide used ($p<0.1$) and numbers of plantain harvested ($p<0.01$) significantly influenced the profitability of the plantain farmers, while age ($p<0.1$), level of formal education ($p<0.05$), amount invested into the business ($p<0.01$) and household size ($p<0.05$) significantly influenced the profitability of the plantain marketers. Only household size ($p<0.01$) significantly influenced the profitability of the plantain processor. In accordance with the findings of the study, we therefore recommend that subsidized cost of inputs and better access to credit among the investors along the value chain would increase the level of return to the investment.

Keywords: Profitability, Plantain, Value Chain, Investment

1. Introduction

Plantain (*Musaceae paradisiaca*) is an important starchy fruit crop. It is ranked fourth world most important food crop after rice, wheat and maize grown in the Humid Tropics areas of the World such as Africa, Asia, Central and North America [1-2]. Plantain production in Nigeria accounted for more than 50 percent of world production [3]. Recent statistics on plantain production placed Nigeria (2,722,000 metric tonnes) at first position in Africa and fifth in the world [3-4]. This is attributed to the fact that investment in plantain enterprise could alleviate rural poverty as well as ensure food security [5]. This could be ascribed to the fact that plantain is a multipurpose crop with great processing potential.

Plantain has low saturated sugar (220 calories), sodium content, and minerals that are essential to human being when consumed raw. It is a good source of potassium, magnesium, phosphate, dietary fibre, and vitamins such as vitamin A, B6 and C that aid vision, good skin and immunity. Due to its high nutrients content, plantain can be used in the treatment of some ailments such as sore throats, tonsillitis, diarrhoea, vomiting, and kwashiorkor [6]. The fresh juice from plantain trunk, fruit stalk and leaves are healing and soothing remedy to burns and anti-bleeding on wounds [7].

Apart from raw consumption, plantain could be processed into various value-added products such as flour, beverages, chips, juice, jams, soft drink depending on the maturity and ripeness of the plantain fruit [8]. The immature fruits are peeled, sliced, dried, processed into powder and consumed as plantain flour. The mature fruits (ripe or unripe) are

consumed boiled, steamed, baked, pounded, roasted, or sliced and fried into chips. Overripe plantains are processed into beer or spiced with chilli pepper, fried with palm oil and served as snacks popularly known as dodo-ikire. Also, plantain leaves are used for wrapping, packaging, marketing and serving of food. Apart from its usefulness to human being, it could be used as animal feeds for livestock's and manure and mulching materials for plants

In the light of foregoing, it is evident that plantain is a reliable source of revenue as well as raw material to agro-industries producing its value-added products. As a result, a lot of Nigerians invest huge amount of money into plantain enterprises to generate substantial income. Investment in plantain enterprise could be in form of cultivation, processing or/and marketing of plantain. Despite the huge capital invested into the enterprise, investors are not realising a reasonable profit that commensurate with their effort and level of investment. Also, PIND [9] noted that marketers gain more than other actors in the value chain due to weak coordination along the value chain. This was often ascribed to some complex set of factors such as infestation of pest and diseases, poor management practices, poor road network and lack of storage facility, and short storage life [10-12]. Since all investors invest huge capital in plantain value chain, it becomes imperative to investigate the returns to each investor along the value chain. Consequently, this paper investigates profitability of investment in plantain value chain in Osun State, Nigeria. Specifically, describes the socio-economic characteristics of the plantain investors, determines the profitability of investors in plantain value chain, and determines the factors affecting the profitability of investors in plantain value chain.

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2.1. Study Area

This study was carried out in Osun State, Southwestern part of Nigeria. The State lies within latitudes 6° and 7°N of the equator and approximately between longitudes 4° and 5°E of Greenwich meridian [13]. It is one of the land- locked states of the Federal Republic of Nigeria, bounded in the West of Oyo State, in the East by Ondo State, in the North by Kwara State and in the south by Ogun State. It covers an estimated area of 9251 square kilometre [14]. The predominant occupation of the State is farming. The crops grown include yam, cassava, maize, rice, cowpea, and perennial crops such as cocoa, kolanuts, plantain, and oil palm.

2.2. Sampling Procedure

Multistage sampling procedure was used to obtain data for the study. The first stage involved purposive selection of three local Government Area (LGAs) based on the volume of plantain production in the areas. The LGAs include Atakumosa west, Irewole and Ife central. The second stage involved random sampling of three villages in each LGAs.

The third stage involved random selection of thirty plantain farmers, thirty-two processors with thirty-eight marketers from the villages. An individual was considered to be a plantain farmer and marketer if he engages in planting and marketing of plantain, respectively. A processor, if the individual is involved in "dodo Ikire", plantain chip, plantain flour and roasted plantain. A total of one hundred plantain investors were used for this study.

2.3. Analytical Technique

2.3.1. Descriptive Statistics

Descriptive statistics such as percentages and mean were used to describe the socioeconomic characteristics of respondents.

2.3.2. Budgetary Analysis

The gross margin analysis was used to estimate the cost and return accruing to each stage in plantain value chain in the study area. The gross margin analysis was calculated by using the formula below:

$$GM = TR - TVC \qquad (1)$$

$$Net\ revenue = TR - TC \qquad (2)$$

$$Profit = GM - TFC\ (depreciated\ value) \qquad (3)$$

Where, TC = TFC + TVC, GM = Gross Margin, TR = Total Revenue, TC = Total Cost, TFC = Total fixed cost, TVC = Total variable cost.

Benefit-cost ratio (BCR)

This measures the rate of returns to the total cost incurred on production [15]. The formula is as follows:

$$BCR_i = \frac{Net\ Profit\ Margin_i}{Total\ Cost_i} \qquad (4)$$

2.3.3. Multiple Regression Model

Multiple regression model was used to determine the factors affecting the profitability of investment in plantain value chain. The implicit function was expressed thus:

$$Y = F\ (X_1, X_2, X_3, X_4, X_5, X_6, X_7, e_i) \qquad (5)$$

Where;

Y = Profitability level at each stage in the plantain value chain; X_1 = Age (Years); X_2 = Educational level of respondent (Years); X_3 = Insecticide cost ($); X4 = Household size; X5 = Raw plantain cost ($); X_6 = Cost of plantain harvested ($); X_7 = Amount invested into the business ($); and e_i = Error term.

3. Result and Discussion

3.1. Socio-economic Characteristics of Investors

The socioeconomic characteristics of plantain farmers were presented in Table 1. The average age was 52.2 (±11.19) years, 41.8 (±10.78) years and 33.42 (±11.99) years for plantain farmers, processors, and marketers, respectively. This implies that the processors and marketers are relatively young. This could indicate that they are energetic and

innovative [16]. The result further implies that an average farmer in the study area is relatively old. This could be attributed to the fact that older people generally stay in the villages and relatively younger people go to cities for education, learning of trade and in search of white-collar jobs. Distribution by gender revealed that about 93.3% of the farmers are male. This could indicate that plantain farming is masculine in nature. The processors (100%) and marketers (92.1%) are majorly female indicating the feministic nature of the job. It also shows suggest that the plantain processor and marketers is gender biased in favour of women. Only few of the plantain investors had tertiary education with 15.8% for the marketers, 6.3% for the processors and none for the farmers. This implies that majority of the respondents are illiterates. Though education is not a prerequisite to invest in plantain business, it could provide the investors with

enough skills and innovation to improve their plantain business. About 93.3% of farmers, 100% for processors and 73.7% of marketers are married. This implies some level of responsibilities into farming business to meet up with family needs. The average farming experience was 26.9 (±10.88) years, 12.47 (±10.78) years and 5.84 (±19.12) years for plantain farmers, processors, and marketers, respectively. This indicates that the respondents have many years of experience their respective businesses. This could have a positive effect on the plantain business. Only 6.7% farmers, 15.6% processors and 13.2% marketers had access to credit facilities. This implies that the investors have limited access to credit facilities. This reiterated the fact that plantain enterprises are maintained by personal funds and cash remittance from friends.

Table 1. Socio-economic Characteristics of Investors.

Variables	Farmers (n=30)	Processors (n=32)	Marketers (n=38)
Age (years)	52.2 (11.95)	41.78 (10.78)	33.42 (11.99)
Gender (%)			
Male	93.3	0	7.9
Female	6.7	100	92.1
Year of schooling (%)			
Less than 9	96.6	62.5	57.9
10-12	0	6.3	15.8
12-18	0	6.3	15.8
Married (%)	93.3	100	73.7
Experience (years)	26.9 (10.88)	12.47 (10.78)	5.82 (19.12)
Access to credit	6.7	15.6	13.2

Note: Figures in parentheses are standard deviations
Source: Field Survey, 2015

3.2. Profitability of All Investors in Plantain Value Chain

The distribution of various costs incurred and returns to all investors in plantain value chain were presented in Table 2. The analysis was computed on twelve (12) months basis for farmers. Budgetary analysis encompasses cost components such as average fixed cost and average variable costs of variable cost of various categories and production income i.e. total income or total revenue. In this study, the monetary value of the outputs was obtained. From the computation, the average total variable cost was $66.783, $90.079, $30.653 for the farmers, processors and marketers, respectively. While, the average fixed cost was $25.76, $1.004, $ 3.961 for the farmers, processors and marketers, respectively. The total revenue was $128.165, $118.489, $41.268 for the farmers, producers and marketers respectively. The gross margin to each enterprise were $61.382, $28.392, $10.615 for the

farmers, processors and marketers, respectively. This shows that all the investors (farmers, processors and marketers) along the plantain value chain were making profit. This indicates that the investors were able to cover all variable cost incurred in course of production. The average net income was $35.622; $27.388 and $6.654 for the farmers, processors and marketers, respectively. This could indicate that the plantain business is profitable at each stage of investment. The benefit ratio was $1.38, $1.30 and $1.19 for the farmers, processors and marketers respectively. This implies that every $100 invested in the enterprise yield additional $138, $130 and $119 for the respective investors. This implies that investors were making profit at each level along the value chain. However, the most enterprising sector in plantain value chain is production followed by processing, while marketing is the least in the study area.

Table 2. Profitability of all Investors in Plantain Value Chain.

Farmers (n=30)		Processors (n=32)		Marketers (n=38)	
Items	Amount ($)	Items	Amount ($)	Items	Amount ($)
Insecticide (lit/ha)	36.096	Raw plantain	63.290	Plantain product	9.817
Herbicides (lit/ha)	21.44	Palm oil	3.52	Transport	0.230
Weeding	3.328	Vegetable oil	9.851	Repackage material	15.209
Fertilizer (kg/ha)	0.426	Pepper	0.745	Sale person	5.397
Bush clearing		Salt	0.300	Total variable cost	30.653
Fertilizer application	3.84	Nylon	1.276	Shop rent	3.961
Herbicide application	1.653	Starch	0.085	Total fixed cost	3.961

Farmers (n=30)		Processors (n=32)		Marketers (n=38)	
Items	Amount ($)	Items	Amount ($)	Items	Amount ($)
Total variable cost	66.783	Sugar	0.533		
Cutlass	0.16	Colouring	0.16		
Building and farm rent	25.6	Onion	0.390		
		Pin	0.186		
		Paper	0.55		
		Telephone	0.88		
		Fire wood	3.179		
		Fuel	2.592		
		Frying cost	2.56		
Total fixed cost	25.76	Total variable cost	90.097		
		Bowl	0.148		
		Knife	0.052		
		Frying pot	0.374		
		Spoon	0.057		
		Sieve	0.125		
		Basket	0.248		
		Total fixed cost	1.004		
Total cost	92.543	Total cost	91.101	Total cost	34.614
Total revenue	128.165	Total revenue	118.489	Total revenue	41.268
Net revenue	35.622	Net revenue	27.388	Net revenue	6.654
Gross margin	61.382	Gross margin	28.392	Gross margin	10.615
Rate of return	0.92	Rate of return	0.31	Rate of return	0.34
Benefit cost	1.38	Benefit cost ration	1.30	Benefit cost	1.19

Source: Field survey, 2015

3.3. Factors Affecting the Profitability of Investors Along Plantain Value Chain

Multiple regression estimates showed the level of significance of variables that were considered to be important factors influencing profitability of plantain enterprise (Table 3). Insecticides applied ($p < 0.1$) and numbers of plantain harvested ($p < 0.01$) significantly influenced profitability level among plantain farmers. The coefficients of insecticides applied ($p < 0.1$) and numbers of plantain harvested ($p < 0.01$) had positive signs, implying that for every unit increase in any of these variables increases the profitability level among plantain farmers by the magnitude of their coefficients; 4.240 and 3.258 units, respectively. Also, the positive coefficient of household size ($p < 0.001$) implies that this variable increases profitability level among plantain processors by the

magnitude of its coefficient (0.629) units. Age ($p < 0.1$), level of formal education ($p < 0.05$), amount invested into the business ($p < 0.01$) and household size ($p < 0.05$) significantly influenced profitability level among plantain marketers. The coefficients of level of formal education ($p < 0.05$), amount invested into the business ($p < 0.01$) and household size ($p < 0.05$) had positive signs, implying that for every unit increase in any of these variables increases the profitability level among plantain marketers by the magnitude of their coefficients; 0.407, 0.610 and 0.518 units, respectively. On the other hand, the negative coefficient of age ($p < 0.001$) implies that this variable decreases profitability level among plantain processors by the magnitude of its coefficient (0.381) units.

Table 3. *Factors affecting the profitability of investors along the plantain value chain.*

Variables	Farmers (n=30)	Processor (n=32)	Marketers (n=38)
Age	-1.730 (0.407)		-0.381* (0.065)
Household size		0.629*** (0.000)	0.518** (0.021)
Level of formal education		0.305 (0.602)	0.407** (0.039)
Years of experience	0.444 (0.505)		
Insecticide used	4.240* (0.085)		
Numbers of Plantain harvested	3.258*** (0.000)		
Raw plantain cost		0.537 (0.473)	
Amount invested			0.610*** (0.002)
Constant	0.223 (0.968)	1.443 (0.507)	0.56 (0.456)
R^2	0.931	0.580	0.630
Adjusted R^2	0.801	0.532	0.398
F	13.08	11.96	3.794

***Significant at 1%, ** Significant at 5%, * Significant at 10%. Figures in parentheses () are p-values.

4. Conclusion and Recommendation

This paper investigated profitability of investment in plantain value chain in Osun State, Nigeria. Descriptive statistics showed that majority of the respondents are illiterate, experienced and married. Majority of the farmers are male, while plantain processor and marketers is gender biased in favour of women. The investors had limited access to credit facilities. Budgetary estimates revealed that plantain business is profitable at each stage of investment in the study area. However, the most enterprising sector in plantain value chain is production followed by processing, while marketing is the least in the study area. Insecticide used ($p<0.1$) and numbers of plantain harvested ($p<0.01$) significantly influenced the profitability of the plantain farmers, while age ($p<0.1$), level of formal education ($p<0.05$), amount invested into the business ($p<0.01$) and household size ($p<0.05$) significantly influenced the profitability of the plantain marketers. Only household size ($p<0.01$) significantly influenced the profitability of the plantain processor. All these significant variables must be considered in an effort to increase profitability of investors along the value chain. Since the investment in plantain processing is labour intensive and highly profitable, efforts should be made to reduce the labour intensive through introduction of mechanization to avert inefficiencies resulting from use of labour. However, subsidized cost of inputs and better access to credit among the investors along the value chain would increase the level of return to the investment.

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