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Analysis of the determinants of investment among the Pro-Vitamin-A cassava farming household in southeast Nigeria

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Abstract

This study analyzed the determinants of investment among Pro-Vitamin A cassava farming households in South East, Nigeria. Multi-stage sampling procedure which involves purposive and random sampling techniques was employed to select a sample size of 348 respondents used for the study. Data were collected with the aid of a structured questionnaire and analyzed using ordinary least square regression analysis. The study found that farming experience (0.0577) and farm income (0.8924) are statistically significant and have positive effect on the amount invested in farming. While the coefficient of price of farming input (-0.0249) has significant negative effect on Pro-Vitamin A cassava investment. The adjusted R-squared value of 0.8775 indicates that approximately 87.75% of the variation in the amount invested in farming can be explained by the explanatory variables. The model's overall significance was assessed using the F-ratio, which yielded a significant value of 71.44 at the 1% level. To support farmers, the government should ensure that essential farm inputs like improved cassava cutting, fertilizers, tractors, and agro-chemicals are easily accessible and offered at heavily subsidized rates.

Keywords: Determinants; Investment; Pro-Vitamin A cassava varieties; Vitamin A deficiency related diseases.

1. Introduction

Cassava (*Manihot esculenta*) is one of the staple crops cultivated by both small and large-scale farmers in Nigeria. Nigeria is the highest producer of cassava in the world, with an estimated annual production of 59,485,947 metric tons (Food and Agriculture Organization, FAO, 2018). Cassava plays a crucial role in Nigeria's agriculture and food security. It is a versatile crop that thrives in various ecological zones, making it suitable for cultivation across different regions of the country. The crop is highly valued for its starchy tuberous roots, which serve as a significant source of carbohydrates in the Nigerian diet. In addition to Nigeria, cassava is also an essential food crop in other countries of Sub-Saharan Africa. It is estimated that more than 500 million people in this region consume cassava meals on a daily basis throughout the year, as highlighted by Egesi and Eke-Okoro (2013). This indicates the substantial reliance on cassava as a primary food source for a significant portion of the population in Sub-Saharan Africa. Cassava is appreciated for its resilience to various environmental conditions and its ability to provide sustenance even in challenging circumstances. It is used to make a wide range of food products, including staple foods like fufu, garri, and tapioca, as well as processed products such as flour, starch, and animal feed. The crop also has industrial applications, including the production of ethanol and biofuel.

Given its importance, cassava plays a vital role in the livelihoods of farmers and the overall economy of Nigeria, as well as in the food security and nutrition of millions of people in Sub-Saharan Africa. Efforts are continually being made to

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improve cassava production, enhance processing techniques, and promote value addition to maximize its potential benefits for both farmers and consumers.

However, the storage root of cassava is low in protein and lacks essential micronutrients such as iron, zinc, and vitamin-A (Ekwe, Nwachukwu, & Ekwe, 2008). Considering the high incidence of vitamin-A deficiency illnesses in tropical regions, the concept of biofortification was introduced to enhance Pro-vitamin A cassava (FAO, 2007). Bio-fortification is an innovative process of enhancing the micronutrient composition of food crops (Olatade et al., 2016; Saltzman et al., 2016). Nigeria is currently facing a significant issue of Vitamin-A deficiency (VAD). According to studies by Aghaji et al. (2019) and Ayinde & Adewumi (2016), it has been reported that over 20% of pregnant women and children under five years old in Nigeria are lacking vitamin-A. Furthermore, Nigeria has a high occurrence of vision impairments, such as night blindness and xerophthalmia, which are linked to vitamin-A deficiency (Ayinde & Adewumi, 2016; Aghaji et al., 2019). The primary cause of this deficiency is a poor diet, particularly among rural dwellers and vulnerable groups like rural women of child-bearing age and children who rely heavily on cassava and cassava by-products in their diets. These individuals are at a higher risk of vitamin-A deficiency. Consequently, there is a growing focus on developing and distributing vitamin-A-enriched cassava to replace the local varieties that have relatively low levels of micronutrients. By implementing bio-fortification, the prevalence of Vitamin-A deficiency can be reduced, considering the prominent role of cassava in the diets of rural households in Nigeria (Oparinde et al., 2016; Garg et al., 2018). Therefore, it is crucial to invest in the crop sub-sector, particularly in Pro-vitamin A cassava farming.

Investment plays a crucial role in fostering the growth of Pro-vitamin A cassava, as research indicates that farmers are motivated to cultivate Pro-vitamin A cassava variants and consumers are enthusiastic about purchasing and consuming products made from vitamin A cassava (Ilona et al., 2017). Thirtle and Piesse (2007) emphasize that through investment, farmers can increase their production capacity to meet the needs of millions, thereby making a significant contribution to food security.

According to Esuma et al. (2019), cassava plays a vital role as a primary food source for over 500 million individuals in Sub-Saharan Africa and holds significant importance as a local staple in Nigeria. The researchers suggested that ensuring a consistent availability of cassava, particularly the Pro-Vitamin A variety, all year round, could contribute to achieving food security and decreasing the occurrence of Vitamin A deficiency among rural households in Nigeria as a whole, with a specific focus on the South East region. Vitamin A deficiency is a significant public health concern, especially in South East of region of Nigeria, as it can lead to various health problems, including impaired vision, increased vulnerability to infections, and reduced immune function. It particularly affects vulnerable populations, such as young children and pregnant women. Nevertheless, prior research conducted in Nigeria has primarily concentrated on factors such as consumer acceptance and demand for biofortified cassava varieties (Oparinde et al., 2016; Birol et al., 2015), as well as the adoption pattern and risks associated with adopting biofortified pro-vitamin-A cassava (Olatade et al., 2016; Ayinde, 2016). Surprisingly, there is a lack of investigation regarding the factors influencing investment decisions among households engaged in pro-Vitamin A cassava farming in the South East region of Nigeria.

Consequently, this study examined the factors influencing investment decisions within the households engaged in Pro-Vitamin A cassava farming in South East, Nigeria.

2. Methodology

The research took place in South East Nigeria, which comprises five states: Abia, Anambra, Ebonyi, Enugu, and Imo. According to the National Population Commission (2006), the population of the South East zone was 16,381,729 individuals. This population was further disaggregated into 8,306,306 males and 8,075,423 females. The region experiences an annual growth rate of 2.6%. Geographically, it falls within the humid tropical agro-ecological zone of Nigeria, located between latitudes 04° 24'N to 07° 00'N and longitudes 05° 34'E to 09° 24'E, as mentioned by Onyeneke (2010).

For the study, a multistage sampling approach was employed to select respondents (sample). The initial stage involved purposefully selecting three out of the five states within the South-East Geo-Political zones. Abia, Anambra, and Imo states were chosen after conducting fact-finding visits to the Agricultural Development Program (ADP) offices in each state within the South East geopolitical zone, as well as the National Headquarters of the National Root Crops Research Institute (NRCRI) in Umudike, Abia State. These visits uncovered a higher concentration of Pro-vitamin A cassava farmers in the selected states. The staff members of NRCRI, Umudike, and ADP officers collaborated in identifying and creating a list of Pro-vitamin A cassava farmers in the selected states. In the second stage, a total of six agricultural zones were formed by randomly selecting two agricultural zones from each of the three states. In the third stage, a sample of 12 Local Government Areas (LGAs) was obtained by randomly selecting two LGAs from each agricultural zone.

Subsequently, in the fourth stage, a sample of 36 communities was generated by randomly selecting three communities from each LGA. Finally, at the last stage, a purposive selection process resulted in 10 Pro-Vitamin A cassava farming households being chosen from each community, totaling 360 respondents. However, out of the 360 households, only 348 households completed and returned their questionnaire accurately.

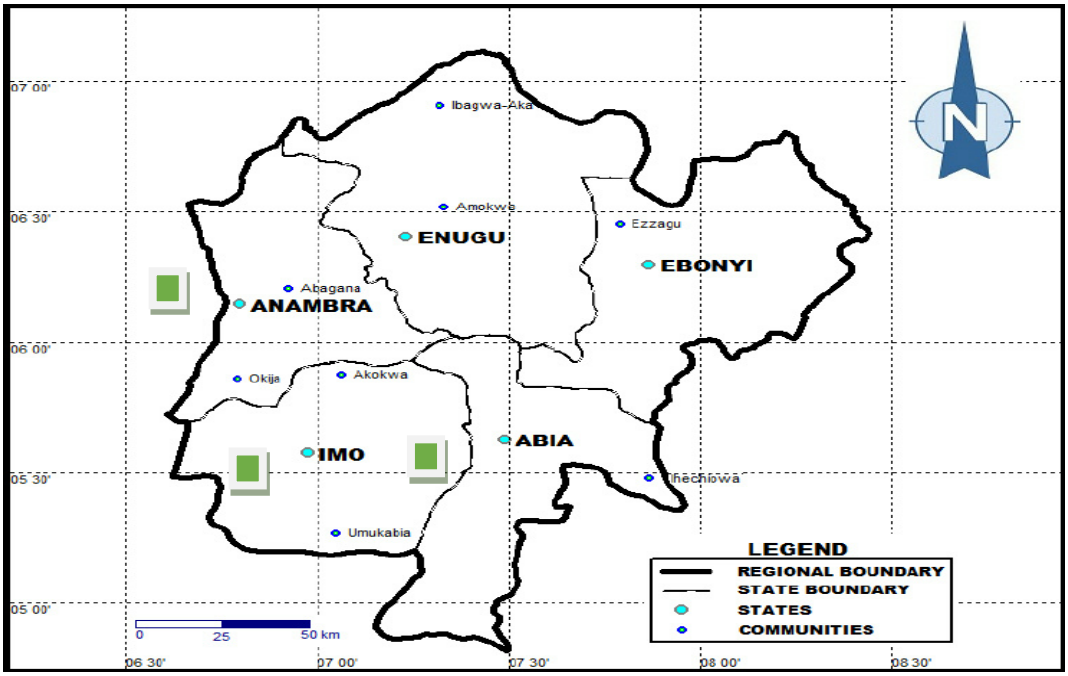

Figure 1 Map of South East, Nigeria

Source: researchgate.net.

A structured questionnaire was utilized to gather data, and copies of it were disseminated to farming households through enumerators. The questionnaire was specifically designed to acquire various information concerning household structure, production, expenditure, income and sales, as well as investment among Pro-vitamin A cassava farming households. The determinants of investment in these households were analyzed using ordinary least square regression analysis.

The explicit form of the OLS regression model for determinants of investment is specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i$$

Where;

Y = Amount of investment (₦)
X_1 = Amount of credit (₦)
X_2 = Price of farming input (₦)
X_3 = Farming experience (days)
X_4 = Amount of Savings (₦)
X_5 = Farm income in Naira
β_1 - β_5 = coefficient of the OLS investment model
ε = error term

3. Results and Discussion

3.1. Determinants of Investment among the Pro-Vitamin A Cassava Farming households in South East Nigeria

Ordinary Least Square (OLS) was used for the analysis. The aim is to understand the determinants of investment in Pro-vitamin A cassava farming in South East Nigeria. To determine the lead function, four regression forms were employed:

linear, double log, semi log, and exponential. The selection of the lead function was based on several criteria including, the function that with the highest R^2 value, highest number of significant variables, significant F statistics and a prior expectation. The findings were summarized and presented in Table 1.0.

Table 1 OLS estimate on determinants of investment among Pro-vitamin A cassava farmers

Variables	**Linear**	**Exponential**	**Semi log**	**Double log(+)**
Intercept	230809.5 (4.29)***	12.3310 (87.50)***	-3994028 (-11.07)***	1.3625 (2.34)**
Amount of credit (X_1)	0.0268 (0.10)	8.24e-07 (1.20)	20035.56 (1.59)	0.0038 (0.19)
Price of farming input (X_2)	-4.8045 (-2.26)**	-5.05e-06 (-0.91)	-18997.61 (-3.55)***	-0.0249 (-2.89)***
Farming experience (X_3)	2451.841 (0.99)	0.0158 (2.45)**	1681.843 (0.14)	0.0577 (2.95)***
Amount of saving (X_4)	-1.0923 (-1.74)*	-3.44e-06 (-2.10)	-7723.825 (-0.58)	-0.0348 (-1.61)
Farm income (X_5)	0.4038 (14.84)***	9.49e-07 (13.32)***	335324.1 (16.94)***	0.8924 (27.95)***
R^2	0.7240	0.6571	0.7509	0.8826
R^{-2}	0.7119	0.6420	0.7399	0.8775
F-ratio	59.82***	43.69***	68.72***	71.44***

Source: Field survey (2020) **+**lead equation, *** Significant at 1%, ** Significant at 5%, * significant at 10%.

The lead equation was selected based on statistical and econometric considerations, opting for the double log functional form. The adjusted coefficient of determination (R^2) is 0.8775, implying that the explanatory variables accounted for about 87.75% of the change in the amount invested in farming. The F-ratio test confirmed the overall significance of the model, yielding a value of 71.44, which indicates significance at the 1% level. The initial investment in Pro-Vitamin A cassava farming showed a positive and significant relationship with farming experience and farm income. This implies that if these factors are increased beyond their current levels, the investment level will also increase significantly. Conversely, the investment in Pro-Vitamin A cassava displayed a negative and significant association with the input price. This suggests that increasing these factors beyond their current levels will result in a significant decrease in investment.

Specifically, the coefficient of price of farming input (-0.0249) is negative and statistically significant at 1%. The implication is that as price of farming input increase, the level of investment decrease. In their research on the determinants of factors influencing farmers' investment in Abia State, Nigeria, Onwumere and Alamba (2010) observed that the level of investment is contingent upon the price of farming input. Conversely, Obike et al. (2019) argued that investment generates the accrual of capital input, which subsequently generates a continuous flow of returns over time. As a result, they posited that augmenting investments (such as acquiring stocks, shares, buildings, machinery, and equipment) would result in heightened productivity.

The regression analysis revealed that the coefficient (0.0577) associated with the number of years of experience in farming exhibited a statistically significant and positive impact on the level of investment in farming. This finding suggests that as farmers gain more experience, there is an observable increase in their investment in agricultural activities. This can be attributed to the proactive economic engagement of experienced smallholder farmers, who prioritize investments in their farming enterprises. Consequently, it can be inferred that as individuals enhance their farming expertise through training and knowledge acquisition, their inclination to invest in farming similarly grows. These results corroborate the earlier findings of Osondu et al. (2015), which concluded that a higher level of farming experience is associated with greater investment in the agricultural sector.

Furthermore, the coefficient (0.8924) associated with farm income indicates a statistically significant positive relationship. This suggests that a rise in farmers' income will result in an increased allocation of funds towards agricultural investments. It is important to note that farmers with limited financial resources may face obstacles when attempting to enter the agricultural enterprise investment sector. This outcome aligns with the conclusions drawn by Oseni and Winters (2009) in their research conducted in Nigeria, where they found that households with higher farm income were more inclined to diversify their investments and allocate more resources towards income-generating activities in farming. Consequently, this behavior contributes to the achievement of food security.

4. Conclusion and Recommendations

The analysis of determinants of investment among Pro-Vitamin A cassava farming households revealed that farming experience and farm income exert a significant positive influence on investments in Pro-Vitamin A cassava farming. Conversely, the price of farming inputs exerts a significant negative impact on Pro-Vitamin A cassava investment. Based on the study's findings, it is crucial to conclude that the level of investment in Pro-Vitamin A cassava farming contributes to food insecurity among farming households. Consequently, to address the adverse and significant relationship between input prices and Pro-Vitamin A cassava farming investment, the study proposes that the government should ensure the availability of subsidized farm inputs such as improved cassava cuttings, fertilizers, tractors, and agro-chemicals to farmers.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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