

## VALUE CHAIN ANALYSIS OF SMALL SCALE CASSAVA PRODUCTION AND MARKETING IN IMO STATE, NIGERIA

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### Abstract

This study examined the value chain analysis of cassava production and marketing in Imo State, Nigeria. Specifically, it examined generic functions involved in the cassava value chain, examined the value addition and operational benefits in each stage of the value chain of cassava production, and examined the factors influencing profit from value addition. Multi-stage sampling technique was used in selecting the respondents used in the study. Data collected using structured questionnaire and interviews administered to the respondents were analyzed using descriptive and inferential statistics such as means, percentages, charts (mapping technique), and regression analysis. The results of data analysis showed that the marketing of cassava started on the farms by producers/farmers and that farmers were the main actors in the cassava value chain. They were involved in transporting of their product to the market or may sell at the farm gate. In other cases, they may process the roots into cassava products before selling which is most common in most rural commodities. Also the result showed that a profit of ₦209920 was made from garri representing 52.20% of all profit in the cassava value chain, while ₦107400 was made from tubers sales representing 26.71% of total profit. The least profit was from processing into tapioca where profit of ₦3400 only was made. The significant variables influencing profit from value addition were age of the respondent, experience, years of educational attainment, quantity of commodity handled, selling price and access to marketing information. It was recommended that entrepreneurs interested in cassava value chain should be encouraged to process into garri for profit maximization.

**Key words:** Cassava, Production, Marketing, Value Chain

### Introduction

The agricultural sector has been described as an engine room for sustainable growth of the Nigerian economy (Olagunju, 2005). After long period of neglect, the sector is gradually receiving attention again. This is borne out of the need to diversify the economy and reduce the over dependence on the oil sector. This has become pertinent and indeed imperative given the current crash in oil prices.

The cassava sub-sector is notably significant in the agricultural sector as a result of its contributions and potentials in the economy. Iheke and Echebiri (2010) identified cassava as a very powerful poverty fighter capable of driving down the price of food in favour of millions of

consumers. According to the Common Fund for Commodities (CFC) (2012), cassava plays a key role in providing food security to more than about 600 million people especially those in the developing nations including Africa, Latin America and Asia. It is grown in almost all the states and thrives in all agro-ecological zones of Nigeria. Cassava is valued for its outstanding ecological adaptation, low labour requirement, ease of cultivation and high yield. These qualities make cassava a reliable food security crop particularly for the poor nations. Cassava is a major national staple food crop. Cassava is planted on about 17 million hectares worldwide, with 50 percent of the hectareage in Africa. Currently, Nigeria is the world largest producer of the crop, accounting for about

47 million tons per annum (FAO, 2011; CFC, 2012). Many farmers' livelihoods depend on cassava as a main source of food and income (Weber, 2012). Farmers are growing cassava as a staple food crop for home consumption and to supplement household income. Cassava roots and by-products are increasingly being used in industries which indicate that cassava has been converted into an industrial crop planted in medium sized to large size farms (voor den Dag, 2003).

There is the need for increased commercialization of agricultural products, competitiveness of agricultural commodities and enterprise by improving market access for small farmers through better supply chain management. Van der Meer (2006) stated that value chains are of growing importance particularly for perishable products such as cassava. Value chain analysis looks at every step a business goes through, from raw materials to the eventual end user and the goal is to deliver maximum value at the least total cost (Porter, 1985). The aim of value chain is to produce value added products or services for a market by transforming resources, and by the use of infrastructures within the opportunities and constraints of its institutional environment. It has been noted that constraints to value chain development are related to market access both local, national and market orientation. While many of the challenges facing the cassava value chain are common to all agricultural products (weak extension services, poor access to credit, poor availability of input supplies, fragmented marketing, etc), critical constraints for cassava processors to meet the demand from the growth markets are linked to the reliability and timeliness of supply and coordination with the processors (Nweke, 2014).

Literature review on value chain has highlighted its importance in addressing several policy and production issues. Increased production, stimulated by high demand and supportive policies requires

postharvest technologies capable of processing large quantities of high quality products for medium to large-scale agro-industries. This requires good knowledge of the commodity chain and availability of processing technologies that will allow processing to industrial scales. This will catalyze development of 'new food' and non-food products thereby expanding the market and creating future income-generating opportunities (Saweda, 2006; Kimathi *et al.*, 2008). According to FAO (2005), consumer habits and rising cost of living in urban areas are also driving the change in favour of traditional foods. It noted that prolonged and sustained increases in cassava production can only be achieved with better market opportunities created by increased demand in urban markets through domestic and industrial use.

Van Melle *et al.* (2007) noted that in Nigeria, chains which were initially started by small scale producers have been replaced by large farms, mostly under direct control of the export companies. It should be noted, however that the small farmers need to be linked to the value chains for them to realize the value chain benefits.

While analyzing the value chain of fruits and vegetables in India, Reddy *et al* (2010) noted that a farmer linked to the value chain receives a higher share of gross value than other stakeholders and that they also received higher prices for each of the vegetables considered during the study. This shows the importance of value chain analysis.

Value added is created at different stages and different actors throughout the chain. Value added may be related to cost, quality, delivery time, delivery flexibility etc. The size of value added is decided by the end – customer's willingness to pay. Value addition is a representation of utility or value added to a community as it moves from one stage, place, or form to another overtime. When the commodity moves from one place to another, place utility is created,

when the commodity is stored overtime, time utility is created and when this community leaves the producers to the consumer with transfer of ownership then possession utility is created. Utility is the satisfaction a consumer gets from a particular product. Values are added according to the various stages the commodity goes through. The value added attracts costs and margins and the margin and the net return such that return is regarded as a reflection of the value added to the commodity.

Therefore value addition takes into account the components of cost and returns. An agricultural commodity undergoes different levels of processing after production; move from place to place overtime thereby incurring cost and adding margins (Henri-Ukoha *et al*, 2010, Fakayode *et al*, 2010). Generally, value addition is directly influenced by the level of cost and return. However, other factors that can cause variation in cost and returns equally influence value addition. Cost incurred and household demography have massive influence on value added to commodities. Cost by nature are composed of production cost, marketing cost, and charges, depreciation on equipment and other cost consistent with the value chain of the commodity. Returns on the other hand are the total incomes realized from the sales of a commodity.

Empirical evidence has shown that cassava production has been on the increase from 1999 to date (FMARD, 2004, Awoyinka, 2009). However, post-harvest system such as processing, packaging, marketing, transportation, distribution have constrained sustainable cassava production in recent times. This has resulted into substantial losses, which complicate food insecurity status (Awoyinka, 2009). Knowledge about value chain analysis of cassava production will enhance direct communication between end buyers and producers which can be a powerful tool in helping cassava producers to understand the

implications of competitiveness as a way of ensuring continued penetration of the national and international markets.

However, despite the importance of cassava in traditional food dishes around the globe, the huge potential of the crop in terms of food security, poverty eradication and wealth creation, has not yet been exploited and is still facing a myriad of challenges which prevent it from becoming a mainstream cash crop in Africa. With the development of stable and differentiated markets for cassava based products and the entrance of private sector investors, the Common Fund believes that many of the constraints observed along the cassava value chain might eventually be overcome.

This major objective of this study was therefore, to analyze the value chain of small holder cassava production in Imo State, Nigeria. Specifically, it examined generic functions involved in the cassava value chain, examined the value addition and operational benefits in each stage of the value chain of cassava production, and examined the factors influencing profit from value addition.

## Methodology

This study was conducted in Imo State of Nigeria. Imo State lies within latitudes 4°45'<sup>1</sup> and 5°61'<sup>1</sup> north of the equator and longitudes 6°50'<sup>1</sup> and 7°25'<sup>1</sup> east of the Greenwich Meridian, with an area of around 5,100 sq km. It is bordered by Abia State on the East, by the River Niger and Delta State on the west, by Anambra State to the north and Rivers State to the south. Besides Owerri, Imo State's major towns are Isu, Okigwe, Oguta, Orlu, Mbaise, Mbano, Mbieri, Orodo and Orsu. The estimated population is 4.8 million and the population density varies from 230-1,400 people per square kilometer (NPC, 2006; NBS, 2014). Imo State is made up of twenty-seven Local Government Areas, grouped into three Agricultural Zones. Imo state is a predominantly [Igbo](#) speaking state, with [Igbo people](#) constituting a majority of 98%.

The rainy season begins in April and lasts until October with annual rainfall varying from 1,500mm to 2,200mm (60 to 80 inches). An average annual temperature above 20 °C (68.0 °F) creates an annual relative humidity of 75%, which can rise to 90% in the rainy season. The dry season experiences two months of harmattan from late December to late February. The hottest months are between January and March. Major crops grown by farmers in the State include cassava, maize, yam, plantain, banana and vegetables. However, marketing of cassava in this area is diversified according to the different forms the commodity is processed into such as gari, fufu, flour etc.

Multi-stage sampling technique was used in selecting the respondents for in the study. In the first stage, two Local Government Areas (Ohaji/Egbema and Mbaitoli) were purposively selected based on their performance in cassava production. In the second stage, four communities were randomly selected from each LGA. The selection of cassava farmers in the communities to form the sampling frame was done in the third stage. In the final stage, 10 cassava farmers were randomly selected from each community, to give a sample size of eighty respondents.

Data collected using structured questionnaire and interviews were analyzed using descriptive and inferential statistics such as means, percentages, charts (mapping technique), and regression analysis. The examination of the generic functions involved in the cassava value chain was analyzed using mapping technique. The value addition and operational benefits in each stage of the value chain were determined to identify possible intervention areas. The sum of value addition made throughout the chain is:

$$\Sigma VA = NVAP + NVAPM + NVAT + NVAE + NVAPS.....(1)$$

Where NVAP = Net value added in production, NVAPM = Net value added in primary marketing, NVAT = Net value added in trading, NVAE = Net value added in export, NVAPS = Net value added in processing and sales

The sum of operational benefits is:

$$\Sigma OB = OBP + OBPM + OBT + OBE + OBPE.....(2)$$

Where OBP = Operational benefit in production, OBPM = Operational benefit in primary marketing, OBT = Operational benefit in trading, OBE = Operational benefit in export, OBPE = Operational benefit in processing & export

Percentage of value added/operational benefit in the particular stage is the ratio of value added/operational benefit in a particular stage to the sum of value addition/operational benefit made throughout the chain (for example in production the percentage in value addition is equal to NVAP/  $\Sigma VA$  and the percentage of operational benefit in production is equal to OBP/  $\Sigma OB$ ).

The examination of the factors influencing profit from value addition was realized using multiple regression analysis. The Ordinary Least Squares technique was analyzed. The implicit form of the model is given as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7).....(3)$$

Where: Y= Profit from value addition (naira),  $X_1$  = age of respondent (years),  $X_2$  =experience (years),  $X_3$  = years of education attainment,  $X_4$  =quantity of commodity handled (kg),  $X_5$  = purchase price (naira),  $X_6$  = selling price (naira), and  $X_7$  = access to market information (access = 1, not access = 2).

## Results and Discussion

### Value chain mapping

These generic functions in the cassava value chain are mapped in 5 groups as input supply, production, primary marketing, processing, and secondary marketing/trading. The main activities and value addition in the value chain are listed in the Figure below.

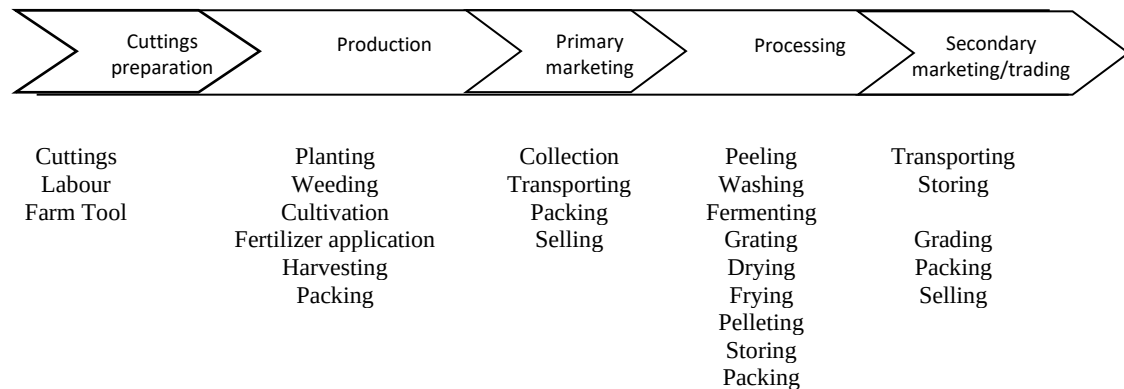


Figure 1: Mapping of cassava generic functions in Imo State

The marketing of cassava starts on the farms by producers/farmers. Farmers are the main actors in the cassava value chain. They are involved in transporting of their product to the market or may sell at the farm gate. In other cases, they may process the roots into cassava products before selling which is most common in most rural commodities. The common products are garri, fufu, tapioca and cassava flour. However, none of the respondent in the study was involved in the processing into flour and its marketing.

### Profit from Value Addition

The estimated profit from the cassava value chain analysis is presented in Table 1. The table shows that a profit of ₦209920 was made from garri representing 52.20% of all profit in the cassava value chain, while ₦107400 was made from roots sales representing 26.71% of total profit. The least profit was from processing into tapioca where profit of only ₦3400 was made. Therefore entrepreneur interested in cassava value chain should be encouraged to process into garri for profit maximization.

Table 1: Profit from value addition

| Item                       | Tuber (₦) | Garri (₦) | Fufu (₦) | Tapioca (₦) |
|----------------------------|-----------|-----------|----------|-------------|
| Revenue from sales         | 37400     | 65850     | 26450    | 2450        |
| Associated cost            | 10550     | 13370     | 6100     | 1600        |
| Profit                     | 107400    | 209920    | 81400    | 3400        |
| Percentage of total profit | 26.71     | 52.20     | 20.24    | 0.85        |

### Factors influencing profit from cassava value addition

The ordinary least squares regression model was estimated for the factors influencing profit from value addition in cassava production. The result is presented in Table 2. The semi-log functional form was chosen as the lead equation. The choice of the lead equation was based on the highest magnitude of the coefficient of determination ( $R^2$ ), the number of significant variables, the conformity of the signs borne by the coefficients of the variable to a

priori expectation as well as the magnitude and significance level of the f-ratio. The coefficient of multiple determination was 0.8311 which implies that 83.11% of the variations in profit from cassava value addition were explained by the variables in the model. The f-ratio was significant at 1% indicating the goodness of fit of the model. The significant variables influencing profit from value addition were age of the respondent, experience, years of educational attainment, quantity of commodity handled, selling price and access to marketing information.

**Table 2: Factors influencing profit from cassava value addition**

| Variable                                        | Linear                 | Exponential               | Double log              | Semi log +            |
|-------------------------------------------------|------------------------|---------------------------|-------------------------|-----------------------|
| Intercept                                       | 0.169<br>(2.43)**      | 1.024<br>(2.32)**         | 3.633325<br>(3.03)***   | 868022.6<br>(5.62)**  |
| Age (X <sub>1</sub> )                           | 2439.371<br>(2.73)**   | 0.0122017<br>(1.43)       | 0.6827965<br>(1.99)     | 0.5374217<br>(2.43)** |
| Experience (X <sub>2</sub> )                    | - 8245.328<br>(- 0.56) | - 0.049785<br>(- 0.35)    | 0.0496553<br>(0.42)     | 41658.3<br>(5.20)***  |
| Level of education (X <sub>3</sub> )            | 49955.708<br>(3.60)*** | 0.0351735<br>(2.67)***    | 0.2480241<br>(1.77)     | 38591.24<br>(2.17)**  |
| Quantity of commodity handled (X <sub>4</sub> ) | -1464.243<br>(- 0.96)  | - 0.0104159<br>(- 1.46)   | - 0.1898523<br>(- 2.32) | 25611.21<br>(2.42)*** |
| Purchased Price (X <sub>5</sub> )               | - 32279.7<br>(-0.99)   | - 0.6711935<br>(- 2.12)** | 0.414228<br>(6.59)      | 4486.331<br>(0.29)    |
| Selling Price (X <sub>6</sub> )                 | -3378.221<br>(- 1.59)* | - 0.0254532<br>(- 1.25)   | 0.0268165<br>(0.24)     | 120607.2<br>(2.73)*** |
| Marketing Information(X <sub>7</sub> )          | 36597.43<br>(5.19)***  | 0.3399582<br>(4.97)***    | 0.4508233<br>(4.24)     | 3945.16<br>(2.88)***  |
| R <sup>2</sup>                                  | 0.6663                 | 0.6343                    | 0.7719                  | 0.8311                |
| R <sup>-2</sup>                                 | 0.6098                 | 0.5713                    | 0.7243                  | 0.7951                |
| f- ratio                                        | 9.78***                | 7.92 ***                  | 15.47 ***               | 22.49***              |

Source: Computed from survey data, 2014.

\*\*\* = Significant at 1%, \*\* = Significant at 5%, \* = Significant at 10%, + = lead equation, (...) = t – ratio.

The coefficient of age was significant at 5% and positively related to profit from cassava value addition. This implied that profit from value addition increase with age. The age may provide an indication of experience in the cassava value addition. This explains the positive relationship between age and profit from value addition.

The coefficient of experience was significant at 1% level of significance and positively related to cassava value addition. This implies that the more experienced the operator in the value chain process, the greater the profit made. The years of experience provides an indication of the practical knowledge acquired by the operator on how to overcome certain inherent challenges and problems and how to reduce cost. This will lead to increase in profit.

The coefficient of level of education was significant at 5% and positively related to cassava value addition. This implies that profit increases with years of educational attainment. Educational increases farmers' analytical and innovative ability and enhances adoption of improved practices that would reduce cost and increase profit. This explains the positive relationship

between education and profit from cassava value addition.

The coefficient of quantity of commodity handled was significant at 1% level of significance and positively related to cassava value addition. This implies that the more the quantity of commodity handled by the operator in the value chain process, the greater the profit made. This could be as a result economics of scale derivable bulk handling of commodities.

The coefficient of selling price was significant at 1% level of significant and positively related to cassava value chain. Higher selling price with cost remaining constant result to higher profit margin. On the other hand, the coefficient of access to marketing information was significant at 1% level of significance and positively related to cassava value addition. This implies that profit from value addition increases with access to marketing information. Access to market information enable the operators to know when to sale based on the prevailing market price.

### Conclusion and Recommendations

Based on the findings from this study, cassava and its derivatives from value

addition remains a thriving business. The highest profit was from processing into garri. Therefore entrepreneurs interested in cassava value chain should be encouraged to process into garri, for profit maximization. There is also the need to explore processing into high quality cassava flour (HQCF) which was not obtainable in the area.

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