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Economic Analysis of Value Addition by Soybean Processing Firms in Cross River State Central Agricultural Zone, Nigeria

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Abstract **– The increasing importance of soybean food in Nigeria calls for efforts to improve it processing. The study examined the economics of value addition by soybean processing firms in Cross River State Central Agricultural Zone, Nigeria. Specifically, the study examined: the value added by processing soybean, identified the constraints of small-scale soybean processing firms and made policy recommendations based on the findings. Data for the study were collected from a sample of 120 respondents. Results obtained indicated that the processing of 1kg of soybean into soymilk raised the value of soybean by ₦950 from ₦250 to ₦1200, while that of soyfour was raised by ₦750 from ₦250 ₦1000. The high value of processed soybean explains the profitability of soybean processing. The likert scale rating shows a strong perception of the processors on constraints to soybean processing for soymilk and soyflour, respectively with average ratings of 3.29 and 3.35. Insufficient capital, lack of credit facilities, inadequate power and water supply, high and multiple government taxes and levies and high cost of spare parts were the constraints that received very high perception of the processors. The following were the recommendations proffered: capacity building programmes should be provided to operators of processing firms so as to upgrade their operations and subsidized credit facilities should be provided to enable operators of processing firm's access modern equipment for their operations.**

Keywords **– Value Addition, Processing Firms, Soymilk, Soyflour, Soybean.**

I. INTRODUCTION

Industrialization in the agricultural sector has been identified as key to economic and social development. The higher the level of industrialization in agriculture in any economy the higher the per capita income and the gross domestic products (GDP) (FAO, 2011). One way this can be achieved is the development of agricultural processing firms, like the soybean processing firm (Kolavillis, Williams and Kauffman, 1997). Agricultural Processing represents the largest proportion of the small scale agro-industries and has played key roles in adding value to agricultural products and hence revenue to the farmers. Agricultural Processing develops the economy and the consumers by local sourcing of raw materials to promote greater linkage and backward integrations to raise the general levels of economic activities. It is estimated that 60% of the labour force in sub-Saharan Africa are gainfully employed in small-scale agricultural processing enterprises (Abang and Agom, 2004).

According to Alibi and Anuonye (2007) processing of agricultural products like soybean to add value improves the digestibility and enhances their appeal to consumers as well as profit for the farmers. Processed soybean also serves to extend the availability of the product beyond the area and season of production, thus stabilizing supplies and increasing food security of individuals (IITA, 2015). Liu (2000) asserted that processed soybean particularly permits great diet diversity, giving consumers access to a wide variety of choices and better range of nutritional values. The most basic level of soybean processing is preservation, which comes in variety of forms, making the food available throughout the year (Liu, 2000). He further noted that with value addition to soybean, post-harvest losses will be reduced to the bearest minimum and their farmers can earn more income from their endeavors, as the issues of seasonality in the supply chain of soybean is eliminated.

Therefore, value addition in agriculture refers to the processing of agricultural products through the combination of other resources like ingredients, raw materials, tools, manpower, knowledge, skills, etc. to enhance the value of the product, more than the original one (Boehijie, Hoofing and Schroeder, 1999). As the product passes through several stages of the value chain, the consumption value of the product increases.

Soybean (*Glycin max*) is a legume that grows in the tropical, subtropical and even the temperate climate and was introduced to Africa in the 19th century by Chinese traders along the East Coast of Africa (IITA, 2015). The crop is an important source of high quality, inexpensive protein and oil, the protein and oil levels are about 40% 20% respectively (Ahmed, 2009). The oil produced from soybean is highly digestible and contains no cholesterol. A by-product from it oil production-soybean cake is used as a high protein animal feed. The crop also improves the soil fertility by adding nitrogen from the atmosphere and used as cover crop to prevent erosion (IITA, 2015).

The crop can be processed into various forms such as soymilk, soyflour , soymeat, soyspice, yoghurt, biscuit, baby food, condiments, breakfast cereals, etc. these products are highly patronized because they are inexpensive, have acceptable taste and high nutritional values as well as major source of the daily protein intake of children and adults (Kokoiwen, 2002). To attain good health in Nigeria, the importance of protein in the daily meal of every citizen cannot be overlooked. FAO (2011) recommends that every individual is expected to consume

about 71grams of protein every day. The development of a cheap protein source like the soybean processing is then a right step forward toward achieving this protein requirement, given that other sources of protein are expensive. This research study is predicated on this premise.

The theoretical framework of this study is mainly on value addition that is value chain analysis. The concept of the value chain analysis is based on the economic value of a product to the consumer. According to Boehijie*, et. al.,* (1999) value chain is a sequence of target combinations of production factors that creates marketable products or services from it conception to the finale consumption. Value chain development concerns improving the crop at every stage of production, thereby making the consumers at the end of the chain satisfied (Boehijie*, et. al.,* 1999).

The study therefore seeks to achieve the following objectives:

i. Examine the value added by processing soybean
ii. Identify the constraints small-scale soybean processing firms
iii. Make policy recommendations based on the findings.

II. Materials and Methods

2.1 Study Area

This study was carried out in selected communities in Cross River State central Agricultural Zone, Nigeria. Cross River State central Agricultural Zone shares an international boundary with the republic of Cameroon to the East, Obanliku and Obudu to the North, Ebonyi state to the West, and Biase and Akamkpa to the south. It covers an approximate land mass of 16,280.02km^2 and lies at latitude 50, 32N and 4027N and between longitude 70 500E and 9028 0E (Ettah, Kuye and Oniah, 2016)). They further noted that the area is approximately 25m above sea level, with annual temperature range of 270C- 330C, while rainfall varies between 1500mm-2000mm per annum. The study area is found in the tropical rainforest zone of the country.

2.2 Sample Size and Sampling Technique

Respondents were selected through a multistage sampling technique. In the first stage, Cross River State central Agricultural Zone was stratified into high and low commercial soybean zones. The division was based on the concentration of soybean processing firms in the area. Two highest zones- Ikom and Ugep were purposely selected. Stage two involved getting a pool of the names of the processing firms, this was achieved through the help of local government area (LGA) business registration units, ministries of agriculture and that of commerce and industries sub units in the two LGA's. From these names, 120 soybean processing firms were randomly selected, who formed the sample size.

2.3 Data Collection and Analysis

Data used for the study were obtained from a cross section of soybean processing farmers through the use of pre tested structured and validated questionnaires. This instrument was earlier subjected to a reliability test and a coefficient of 0.79 obtained using the Cronbach Alpha technique. It was also validated by pilot testing and passing through erudite scholars in the subject matter (Agricultural Economics), to ensure that it possessed both face and content validity. In other to check the consistency of the measuring instrument over time, reliability test was conducted using the test-retest method. The same questionnaire was given to the same respondent at two points in time (an interval of seven days) and the scores were compared. They were administered to the operators of the soybean processing firms. The questionnaire included such questions like: source of seeds supply, the cost and quantity of whole soybean seed, selling prices, and amount realized after sale of product, types and number of machines used, cost of machines, availability of spare parts, taxes and levies paid and problems encountered in processing soybean.

2.4 Data Analysis

The value chain model was used to realize objective i. the gross value added was determined as follows:

$$V_a = V_p - V_b \quad (i)$$

Where V_a = value added to whole soybean seed after processing in (#/kg),

V_p = value of processed soybean products, from one kg of soybean seed (#) and

V_b = value of processed soybean per kg (#).

This can be presented in percentages as follows:

$$V_a\% = V_p - V_b / V_p x\ 100\% \quad (ii)$$

When the value of the input used in processing is subtracted from V_a in equation (ii) the net value added is obtained. This principle can be applied at any point in the value chain to determine the value added at that point.

Objective (ii) was realized with the four point likert scale type rating technique. The four rating forced a choice on the respondents, since there is no midpoint to make them indifferent. The grading in this order is agree (SA) agree (A) disagree (DA) strongly disagree (SD), with corresponding values of 4, 3, 2, and 1 respectively. The mean score of the respondents based on the 4-point rating scale was computed as: $\frac{4+3+2+1}{4}$ = 2.50 cut off point.

III. Result and Discussions

3.1 Value Added to Soybean Processing Soymilk and Soyflour

Table 1 and 2 shows the value added by processing soybean processing soymilk and soyflour respectively. From table 1 the processing of 1kg of soybean into soymilk raises the value of soybean by ₦950 from ₦250 to ₦1200, while that of soyflour was raised by ₦750 from ₦250 ₦1000 in table 2. This indicated that there is a value addition to soybean processed into soymilk and soyflour respectively. The high value of processed soybean explains the profitability of soybean processing and could be the reason the business is thriving in the study areas. This result agrees with the findings of Kokoiwen (2002) who also realized profit in processed soybean.

Table 1. Value added by processing soybean into soymilk

Sn	Items	value
1.	Value of 1kg of soybean	₦ 250
2.	Value of 1kg of soybean processed into soymilk	₦1200
3.	Value added	₦950

Source: field survey, 2017.

Table 2. Value added by processing soybean into soyflour

Sn	Items	Value
1.	Value of 1kg of soybean	₦ 250
2.	Value of 1kg of soybean processed into soyflour	₦1000
3.	Value added	₦750

Source: field survey, 2017

3.2 Perception of Processors on Constraints to Soybean Processing

The result of the likert scale rating shows a strong perception of the processors on constraints to soybean processing. These are shown in tables 3 and 4 for soymilk and soyflour, respectively with average ratings of 3.29 and 3.35. insufficient capital, lack of credit facilities, inadequate power and water supply, high and multiple government taxes and levies and high cost of spare parts are the constraints that received very high perception of the processors, i.e above 2.5 cut-of-point.

3.3. Likert scale rating perception of the processors on constraints to soybean processing soymilk.

Constraint	**Average Rating/Points**
Insufficient capital	4.70
Lack of credit facilities	3.38
Lack of required machine	2.78
Inadequate power supply	4.67
Inadequate water supply	3.86
Low patronage	2.15
High govt. taxes/levies	3.98
Poor accessibility	3.40
Low supply of soybean seed	1.35
Lack of experience	2.88
High cost of spare parts	3.07
Average rating	3.29

Source: field survey, 2017.

3.4 Likert scale rating perception of the processors on constraints to soybean processing soyflour.

Constraint	**Average Rating/Points**
Insufficient capital	4.90
Lack of credit facilities	4.83
Lack of required machine	3.63
Inadequate power supply	4.15
Inadequate water supply	4.05
Low patronage	2.10
High govt. taxes/levies	4.07
Poor accessibility	3.25
Low supply of soybean seed	1.30
Lack of experience	1.45
High cost of spare parts	3.20
Average rating	**3.35**

Source: field survey, 2017.

IV. Conclusion and Policy Recommendations

The study examined the economics of value addition by soybean processing firms in Cross River State Central Agricultural Zone, Nigeria. Specifically, the study examined the value added by processing soybean, identify the constraints of small-scale soybean processing firms and make policy recommendations based on the findings. Data for the study were collected from a sample of 120 respondents. Results obtained indicated that the processing of 1kg of soybean into soymilk raised the value of soybean by ₦950 from ₦250 to ₦1200, while that of soyfour was raised by ₦750 from ₦250 ₦1000. The high value of processed soybean explains the profitability of soybean processing. The Likert scale rating shows a strong perception of the processors on constraints to soybean processing for soymilk and soyflour, respectively with average ratings of 3.29 and 3.35. Insufficient capital, lack of credit facilities, inadequate power and water supply, high and multiple government taxes and levies and high cost of spare parts were the constraints that received very high perception of the processors. The following were the recommendations proffered: capacity building programmes should be provided to operators of processing firms so as to upgrade their operations and subsidized credit facilities should be provided to enable operators of processing firm's access modern equipment for their operations.

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