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Profitability and Value Addition of Maize *(Zea Mays L.)* Processing in South-Eastern Nigeria.

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A R T I C L E I NFO

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Value Addition,

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ABSTRACT

This study was carried out to examine profitability and value addition of maize (Zea mays L.) processing into by-products (such as sweet corn, popcorn, corn flakes, corn meal, corn oil, corn flour e.t.c) based on the methods of processing technology being used in Imo State South-eastern Nigeria. Its specific objectives includes; the socio-economic characteristics of maize processors, source of raw maize as well as disposable of value added products of maize, methods of processing technology used, average costs and returns analysis of processing technology for value added products of maize and its profitability per week, constraints encountered by maize stakeholders. The three agricultural zones were used through the adoption of Questionnaire/interview schedule and also, purposively selected with three stage random sampling technique that give a total of 160 respondents for the study. Data were analyzed using Descriptive Statistics, Value Added/Gross Margin Analysis. The study revealed that maize (Zea mays L.) processing is profitable and has a vital value added concept. Thus, the level of profitability and value addition is higher for processors using Mechanized Processing Technology than those processors using Manual Processing Technology. This is due to reduction in processing cost, high yield of output with great efficiency at limited period of time. In view of its potential for attainment for food security and good standard of living, it is concluded that processors that currently using Manual Processing Technology should be encouraged to shift to Mechanized Processing Technology because it saves time and money that can be put into other economical use. Thus, it was recommended that more Processing centres should be established in each of the agricultural zones of South-eastern Nigeria and processors should have access to credit facilities from bank and international organizations.

INTRODUCTION

Maize *(Zea mays L.)* is also known as corn. It belongs to the Genus *Zee L.*- corn, Family *Poaceae* – Grass family, Order *Cyperales*, Class *Liiopsida* – Monocotyledons, Subclass *Commelinidae*, Division *Magnoiiophyta* – Flowering plants, Subdivision *Spermatophyta* – Seed plants, Kingdom *Plantae* – Plants and Subkingdom *Tracheobionta* – Vascular plants.

Maize is a cereal grain that was originated from Southern Mexico about 10,000 years ago. It is the most widely grown grain that has become a staple food in various parts of the world with its total production surpassing that of wheat and rice (FAO, 2014). It is ranked the fifth largest in land area cultivation, the third largest in yield and the fourth largest in output (Surinder, 2011). Maize is a major cereal food crop in West Africa that is cultivated in Sub-Saharan Africa thus, it is one of the most important grains in Nigeria. It provides food, animal feeds and raw materials for some agro-based industries in Nigeria. About 65% of it is consumed by man and animals while 35% is utilized in various industrial processes (Igbokwuwe, 2015).

Processing implies a change in form of the original produce. That is, it is the treatment given to agricultural produce after harvesting which adds value

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to the produce for consumption and satisfaction (Igbokwuwe, 2015).

Maize is processed into different products by efficient processing methods which includes sweet corn, flint corn, pod corn, popcorn, dent corn, field corn, corn meal, corn flakes, corn oil etc. This efficient processing methods is regarded as Processing Technology that comprises of two types:-

i. Manual Processing Technology
ii. Mechanized Processing Technology (Igbokwuwe, 2015).

Manual Processing Technology implies processing for consumption only in which family basis is attained. While Mechanized Processing Technology implies processing for market sales for profit maximization (Igbokwuwe, 2015).

Value Addition simply implies the process of increasing the economic worth or value of a product/commodity by transforming it into another product/commodity (AMRC). That is to say, any product that undergoes any form of operation from changing its original stage to another that has economical worth or value and attainable is refer as Value Added Product. Therefore, Maize (Corn) can be known as a value added cereal crop because it can be transformed from its original/harvested stage to by-products that has economic value and use to the society for consumption and utilization. To this effect, technical efficiency is a component of economic efficiency that reflects the ability of a farmer/processor to maximize output from a given level of inputs (Adesiyan, 2015). It can be traced back to the beginning of theoretical developments in measuring (output oriented) technical efficiency (Debreu, 1951&1959). In view of this, there is a growing literature on the technical efficiency of value addition and its profitability on agricultural products. However, this study focus on profitability and value addition of maize processing that has the following objectives; the socio-economic characteristics of maize processors, source of raw maize as well as disposable of maize value added products, methods of processing technology used, average costs and returns analysis of processing technology for value added products of maize and its profitability per week, constraints encountered by maize stakeholders.

METHODOLOGY

The study area is Imo State with a tropical climate of two distinct seasons. The annual rainfall ranges between 1,000mm to 1,500mm, temperature of about 30°c to 35°c and humidity of 35% to 60%. A three stage random sampling technique was used in selecting the sample for the study. The first stage involves random selection of the three agricultural zones (Owerri, Okigwe and Orlu) as lineated by State Agricultural Development Programme (ADP). The second stage involves a random selection of fifteen villages from each zones (ie five villages from Owerri zone, five villages from Okigwe zone and five villages from Orlu zone) using the State Agricultural Development Programme (ADP) listing as sampling frame. The three stage involves a random selection of twelve households in each villages of the three agricultural zones of the state. A total of 180 farming households were chosen but only 160 farming households were finally used for this study as some of the other households did not engage in maize processing. The source of data used for this study was basically primary that involves the use of Questionnaire/Interview Schedule with the help of Agricultural Extension Agents working in each of the selected areas. Analytical techniques used for this study involves Descriptive Statistics, Valued Added/Gross Margin Analysis.

GROSS MARGIN ANALYSIS.

The Gross Margin Analysis (GMA) is a model that is used to estimate the costs, returns, profitability or negativity of maize processing. The Total Revenue (TR) represents the value of output of maize processing from the farm/processing machine or processing industries (ie physical quantity of the crop multiplied by the unit price). The Total Cost on the other hand is made up of the "Variable and Fixed" components. Variable Cost (VC) also known as specific cost varies directly with the level of processing/value addition which include expenditure on labour, gasoline for Mechanized Machine/Grater e.t.c. Fixed Cost (FC) are known as overhead cost that do not vary with the level of output and consist of cash expenses (on repairs and maintenance etc.) and non-cash adjustment (depreciation on farm/processing tools, equipment and machinery).

The Gross Margin Analysis of Value Added Products of Maize Processing was expressed as;

$$GM = TR - TVC$$

Where GM = Gross Margin
TR = Total Revenue
TVC = Total Variable Cost

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RESULTS AND DISCUSSIONS.

Table 1: Socio-economic characteristics of Respondents.

Variable	Frequency	Percentages
Age (in years)		
< 30	38	23.7
31 – 40	41	25.6
41 – 50	54	33.8
>50	27	16.9
Total	160	100.0
Sex		
Male	57	35.6
Female	103	64.4
Total	160	100.0
Marital Status		
Single	48	30.0
Married	67	41.9
Widowed	35	21.8
Divorced	10	6.3
Total	160	100.0
Experience (in years)		
< 5	24	15.0
6 – 10	48	30.0
11 – 15	57	35.6
>15	31	19.4
Total	160	100.0
Status of Farmers		
Full-time	95	59.4
Part-time	65	40.6
Total	160	100.0
Education		
No formal education	70	43.8
Primary	44	27.5
Secondary	29	18.1
Tertiary	17	10.6
Total	160	100.0
Occupation		
Farming	76	47.5
Civil servant	42	26.3
Trading	27	15.9
Artisan	15	6.3
Total	160	100.0

Source: Field Survey, 2022.

Table 1 shows the socio-economic characteristics of the respondents. It reveals that 83.1% of the respondents are still within the productive ages mainly in the hands of females (64.4%). Majority of the respondents are married (41.9%) with 11-15 years of experience (35.6%) and no formal education (43.8%). This shows that majority of the farmers (processors) are full-time (47.5%) farmers (processors) that can make positive contribution to agricultural production and also, depends on farming for livelihood as well as raw maize for processing.

Table 2: Distribution of Respondents according to Source of Raw Maize and Disposable of Maize Value Added Products.

Source	Frequency	Percentage
Personal Farm	85	53.1
Purchased/Leased Farm	47	29.4
Cooperative Farm	28	17.5
Total	**160**	**100.0**
Disposable		
Home Consumption only	46	28.8
Market Sales only	114	71.2
Total	**160**	**100.0**

Source: Field Survey, 2022.

Table 2 shows that 53.1% of the respondents get raw maize from their personal farm, 29.4% purchased raw maize from purchased/leased farm and 17.5% acquire raw maize from cooperative farm. This implies that majority of the respondents own their harvested maize in which they gets their benefits. Also, the table shows that 28.8% of the respondents offers their various maize value added products for their home consumption. While 71.2% of the respondents offers their various maize value added products for market sales. This implies that majority of the respondents sells their various maize value added products to earn income for sustaining their standard of living in which the Coronavirus (Covid-19) Pandemic as well as insecurity outbreak brought serious havoc to the growth and development of the economy nationwide as well as worldwide.

Table 3: Distribution of Respondents according to the Processing Technology used.

Types	Frequency	Percentages
Manual Technology	72	45.0
Mechanized Technology	88	55.0
Total	160	100.0

Source: Field Survey , 2022.

Table 3 shows that 45% of the respondents use Manual Processing Technology while 55% of the respondents use Mechanized Processing Technology. This implies that majority of the respondents in the study area depends on the use of Mechanized Processing Equipment.

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Table 4: Average Costs and Returns Analysis of Processing Technology for Value Added Products of Maize per week.

	Cost (₦)	Returns (₦)
Manual Technology	46,170	91,230
Mechanized Technology	82,550	193,900
Total	128,720	285,130

Source: Field Survey,2022.

Table 4 shows the Costs and Returns of the various Processing Technology used per week. The Manual Processing Technology has an average cost of ₦46,170.00K and ₦91,230.00K as an average returns per week. While the Mechanized Processing Technology has an average cost of ₦82,550.00K and ₦193,900.00K as an average returns per week. Therefore, Total Cost (TC) per week is ₦128,720.00K and Total Returns (TR) per week is ₦285,130.00K.

Table 5: Gross Margin Analysis of Processing Technology for Value Added Products of Maize per Week.

	Cost (₦)	Percentage (%)	Returns (₦)	Percentage (%)	Gross Margin (₦)	Percentage (%)
Manual Technology	46,170	35.9	91,230	32.0	45,060	28.8
Mechanized Technology	82,550	64.1	193,900	68.0	111,350	71.2
Total	128,720	100.0	285,130	100.0	156,410	100.0

Source: Field Survey, 2022.

Table 5 shows the Gross Margin of Processing Technology for Value Added Products of Maize per week. The result revealed that Gross Costs (GC) accounted 35.9% (which is ₦46,170.00K) per week for Manual Processing Technology while 64.1% (which is ₦82,550.00K) per week was for Mechanized Processing Technology. Also, it shows that Gross Returns (GR) accounted 32% (which is ₦91,230.00K) per week for Manual Processing Technology and 68% (which is ₦193,900.00K) per week for Mechanized Processing Technology. Therefore, Gross Margin (GM) revealed 28.8% (which is ₦45,060.00K profitable) per week for Manual Processing Technology and 71.2% (which is ₦111,350.00K profitable) per week for Mechanized Processing Technology. Hence, majority of the respondents are still within the active ages and value addition of maize processing are still in the hands of married and experienced processors. However, the Total Returns (TR) of the Processing Technology for Value Added Products of Maize per week is ₦285,130.00K while the Total Cost (TC) of the Processing Technology for Value Added Products of Maize per week is ₦128,720.00K. Therefore, the Gross Margin of the Processing Technology for Value Added Products of Maize is ₦156,410.00K which implies that value Added products of maize processing is highly profitable in the study area. Also, it implies that the best Technology for value added products of maize processing in the study area is Mechanized Processing Technology which guarantee efficient viability of available resources with optimum outputs.

Table 6: Constraints encountered by Maize Stakeholders.

Constraints	Percentage (%)	Rank
Inadequate Credit Facilities	33.6	1.
Inadequate Capital	21.2	2.
Poor Storage Facilities	15.5	3.
High Cost of Transportation	12.4	4.
Poor Electricity	8.1	5.
Poor Access to Information	6.2	6.
Poor Accessible Roads	3.0	7.
Total	100.0	

Source: Field Survey, 2022

Table 6 shows the constraints encountered by maize stakeholders which includes inadequate credit facilities, inadequate capital, and poor storage facilities. High cost of transportation, poor electricity, poor access to information and poor accessible roads. Thus, efforts need to be pit in place to reduce these challenges; this will go a long way in improving the profitability and its value addition of maize processing in the study area.

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CONCLUSION.

From the above results, the level of profitability and value addition is higher for processors using Mechanized Processing Technology than those processors using Manual Processing Technology. This is due to reduction in processing cost, high yield of output with great efficiency which saves time and money that can be put into other economical use in attainment for food security and good standard of living.

RECOMMENDATION.

Despite the climatic conditions and constraints that affects the value added products of maize processing especially the Coronavirus (Convid-19) Pandemic and the high rate of insecurity, value addition of maize processing is profitable and attainable. Therefore, it is recommended that processors should focus on Mechanized Processing Technology. Also, it is recommended that Mechanized Processing Centers for Value Addition of Maize should be established specifically in each of the agricultural zones of the South-eastern Nigeria by Federal and State Governments to increase scale of operations, outputs, income (with net profit) that will boost food security as well as the Economy of South-eastern Nigeria. Finally, it is recommended that processors should have access to credit facilities for banks and international organizations.

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