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Economic Analysis of Agricultural Marketable Surplus of Maize in Owerri Agricultural Zone of Imo State, Nigeria

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Abstract **– Maize is a vital staple food crop cultivated extensively in Southeast Nigeria especially in Owerri Agricultural Zone of Imo State. In spite of the high yield of Maize in this area, little research has been carried out on Marketable Surplus of Maize in the study area. This study earlier carried out in 2016 was repeated in 2017 on an evaluation of Agricultural Marketable Surplus of Maize (Zea Mays) in Owerri Agricultural Zone of Imo State, Southeast Nigeria. Purposive and random sampling techniques were used to select 60 maize farmers from three Local Government Areas (LGAs) in Owerri zone. The primary data collected were analyzed using descriptive statistics, gross margin and regression analyses. Results showed that an average of 968kg/ha of maize was produced which gave a computed average gross income (GI), of N108, 150 and net income (NI) of N100, 808. The average marketable surplus was 582kg/ha and gave average GI of N50, 250 and NI of N42, 908 to a maize farmer in the study area. Determinants of marketable surplus of maize presented under Cobb-Douglas production function showed that the coefficients of X_1 (quantity of grains planted), X_2 (farm size), X_4 (Labour) and X_7 (Credit) were significant, with positive correlation to maize production at P=0.01. Similarly, the coefficients of X_3 (Fertilizer used) and X_6 (farmers experience) were significant, with positive correlation to maize production at P=0.05. These are indications that increase in any of these variable factors would increase production of maize and it's marketable surplus. However, the coefficients of X_5 (distance to market) and X_8 (household size) were not significant. Some of the constraints posited by the maize farmers were inadequate storage facilities (17.52%), lack of credit to farmers (17.16%), inadequate inputs (14.24%), pests/diseases (12.78%), high cost of labour (11.67%) etc. Based on the findings, the study recommends that maize farming should be intensified. More farm lands made available to maize farmers, cultivation and processing of maize need to be mechanized and improved seeds, adequate inputs at reduced prices, credits at low interest rates and good storage materials etc, should be made available to maize farmers. Farmers need to be encouraged to cultivate maize twice in a year by providing irrigation facilities.**

Keywords **- Evaluation, Marketable surplus, Maize, Owerri Zone.**

I. INTRODUCTION

Maize (*Zea Mays*) is an important cereal food crop which belongs to the *gramineae* family and ranks high after rice and wheat in the world market. It has been noted to provide stable food for a large population especially in developing countries (FAO/ILO, 1997), feed for livestock and raw materials for some local industries. Maize according to Hussan *et al.,* (2003) is the most vital grain crop and fodder cereal in both irrigated and rainfed agriculture in the semi-arid and arid tropics. Due to it's high yield potential, wide acceptability and usage as a food and feed for livestock in the world, it is regarded as 'queen of cereals' (Chhidda, *et al.,* 2006) and the most often consumed staple (IITA, 2014.) About 80 percent of the produce is consumed by man and animals and the remaining 20 percent used as raw materials for industries. Maize has high content of carbohydrate, with low quantity of protein, fibre and oil and consumed by man in various forms; boiled, roasted, fried or processed into pap and maize flour (Obilama and Farjesmisi, 1997). Some industrial by-products of maize are; starch, ethanol, fructose, maize flour etc. In addition, the maize plant serves as good source of fodder or silage for livestock.

Maize is cultivated in many parts of Nigeria, especially in the Savannah and rain forest regions such as Imo State; mainly on subsistence level. However, in Owerri agricultural zone of Imo State, some of the Local Government Areas (LGAs), have maize as their chief staple food crop and cultivate it as a cultural food crop. This is particularly so in areas where the soil is fertile and conducive for good yield of hybrids of maize. Though in such area, maize is cultivated extensively, celebrated and consumed excessively by the farm-households, especially during harvest period, yet farmers have excess for the urban markets.

Marketable surplus of food crop refers to the quantity of the output that is available for sale in the market after requirements of the producer for consumption, seed and feed have been met (Ilori, 1974). Similarly, Howell (1998), stated that marketable surplus is the amount of output either privately or publicly owned, may be in excess of domestic requirements. It should be noted that marketable surplus of agricultural produce is unlike agricultural commercialization which has to do with increase in quantity or proportion of agricultural produce sold by farmers (Pradhan, *et al.,* 2010; Mather, *et al,* 2013), where the main intension is to produce mainly for sale and maximization of profit (Sokoni, 2008; Yoon-Dom and Yoon, 2009; FAO, 2010). Therefore, marketable surplus exists irrespective of the scale or system of farming adopted (subsistence or commercial), provided

there are excess of the produce to sale after the producer had met his household and future farm requirements.

Availability of market for agricultural produce makes it possible for the sale of surplus output and stimulates economic activity. Accordingly, Olukosi and Isitor (1990) noted that the activity of agricultural marketing directs the flow of produce from the point of production (producer), till it reaches the ultimate consumer. Thus, the farm output flows through the channels of marketing which take care of marketing margins that represent the difference of what the consumer pays for a commodity and what the farmer receives which is expressed as a percentage of producer's price.

Marketable surplus of maize is subject to some constraints such as competition between quantity of the output demanded for human consumption and that required for livestock feed and/or industrial uses due to small scale of operation. Others border on tenure system, nature of market/marketing system, transportation, storage, availability of credit, price fluctuation, etc.

Though an increase in marketable surplus of maize is required to supply or provide food for the teeming population and raw materials for local industries, there is a research gap on the requirements and constraints to achieve adequate marketable surplus of maize mostly grown by small scale farmers in various parts of Nigeria and Owerri Agricultural zone in particular. This study is required to fill the gap and contribute to knowledge.

II. Materials and Methods

The study was conducted in Owerri agricultural zone of Imo State which is made up of nine (9) Local Governments Areas (LGAs) out of the twenty seven (27) LGAs of the State. Three LGAs known for maize cultivation, namely; Owerri North, Ngor Okpala and Ezinihitte Mbaise were purposely selected. The list of registered maize farmers supplied by each LGA's Extension officer representative formed the sample frame. From the lists, twenty five (25) maize farmers were randomly selected from each LGA. This gave a sample size of 75 maize farmers. However, when the questionnaire returned by the respondents (farmers) were validated, only 60 (farmers) were certified and used for the study. Primary and secondary data were used in the study. The primary data were analysed by the use of descriptive statistics, gross margin and regression analyses.

The gross margin (GM) analysis is expressed as GM = TR – TVC,

Where GM = Gross Margin

TR = Total Revenue

TVC = Total Variable Cost

The OLS regression model is expressed explicitly as follows:

Q = $FX_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8$ +e) Where:

Q=Qty of Maize produced (kg/ha); X_1=Qty of seeds planted (kg/ha); X_2= Farm size (Ha)

X_3= Qty of fertilizer used (kg/ha); X_4= Labour used (Man-day/ha.); X_5= Distance to market (Km/hr.); X_6= Farmer's experience (yrs.); X_7= Availability of credit (₦)
X_8= House hold size e=Stochastic error

III. Results and Discussion

Table 1 shows the average budgetary analysis for a hectare of maize farm. An average of 968kg/ha was produced, out of which the farmer used 386kg/ha (286kg consumed and 100kg stored) and the difference of 582kg/ha was the marketable surplus. The total revenue for 968kg/ha was N145, 200 and for marketable surplus of 582kg/ha was N87, 300. On the average, a farmer in the study area incurred a total variable cost (TVC) of N37, 050 and total fixed cost (TFC); (Fixed assets' depreciation value) of N7, 342. On computation, the total average gross income (GI) was N108, 150 and net income (NI) was N100, 808 per hectare of maize farm. That of marketable surplus was; N50, 250 and N42, 908 for GI and NI respectively. These results show that production of maize is a profitable agricultural enterprise and coincided with the findings of (Onuk *et al.*, 2010 and Mohammed *et al.,* 2010).

Table I: Average Revenue and Cost Structures for One hectare of Maize Farm

Items	N	Item	Unit/ha	Value N
Costs		**Revenue**		
A. Variable Costs (VC)		Total Output (TR)	968	145, 200
Fertilizer	7, 000	Total qty consumed	286	42, 900
Agro-Chemicals	6, 350	Total qty stored	100	15, 000
Labour	20, 240	Marketable Surplus (MSR)	582	87, 300
Transportation	3, 440			
	(a) Total Variable Cost 37, 050			

		TVC)		
(B) Fixed Costs		Total Gross Income (TR-TVC)		108, 150
Land	3, 560	Total net income (TR-TC)		100, 808
Cutlass	1, 432	Marketable GI(MSR-TVC)	Surplus	50, 250
Hoes	1, 600	Marketable (MSR-TC)	surplus NI	42, 908
Baskets/Basins	750			
(b) Total Fixed cost (TVC)	7, 342			
Total Cost (TC) (A+B)	44, 392			

Source: Field Survey data, 2017.

The factors affecting marketable surplus of maize is presented in table 2. The coefficients of X_1 (quantity of grains planted), X_2 (Farm size), X_4 (Labour used) and X_7 (credit) were significant and had positive correlation (P=0.01) with maize production. Coefficients of X_3 (fertilizer used) and X_6 (farmers' experience) were significant (P=0.05) and positively correlated with productivity of maize. The results implied that increase in any of these independent (variable) factors, leads to increase in maize productivity. Some studies have identified scarcity and high costs of agricultural resource inputs as major impediments to raising the productivity of small holder farmers (Egwuda, 2001; Ekunwe *et al,* 2008 and Adejoh, 2009). Credit was posited to be instrumental to acquisition or procurement of the required farm inputs and development of agriculture (Nwaru, 2004 and Nwagbo, 2009). Arguable, increase in labour could have reduced marketable surplus of maize due to high cost of labour as adduced by farmers in the study area. Farming in the area is not mechanized, so farmers depended much on hired (unskilled) labour. Secondly, increase in farm size requires more labour. Notably, the coefficients of X_5 (distance to market) and X_8 (household size), were not significant. These were attributed to high demand for maize after harvest and most farmers sold at farm gate prices reducing cost (transportation) for the rural producers and increases the price of maize in urban markets. Harris (1984), observed that distance to market, level of marketed surplus of cereals were relatively related. Similarly Christopher, *et al.,* (2014), opined that distance to nearest town has positive and significant effect on food crop farmers' decision to participate in the market.

Table 2: Determinants of marketable surplus of maize

Double Log Variables	Regression Co-efficient	Standard error	T-Values
Constant X_1	1.640	0.138	11.879***
X_1(qty of seeds	1.097	0.153	7.146***
X_2 (Farm size)	0.020	0.087	2.429***
X_3 (Fertilizer)	0.063	0.026	1.843**
X_4 (Labour)	0.025	0.014	2.792***
X_5 (Distance to market)	0.251	0.183	0.226^{NS}
X_6 (Farmer's Exp)	0.220	0.103	2.135**
X_7 (Credit)	0.347	0.152	2.614***
X_8 (Household size)	0.039	0.149	-0.264^{NS}
R^2 0.900		***Sig. at P<0.01	
F-Value 75.191		**Sig. at P<0.05	

Source: Field survey data, 2017.

Table 3 shows the constraints to marketable surplus of maize which were ranked in descending order of magnitude based on the farmers perception. The limitations and their percentage ranking computed under multiple responses are; inadequate storage facilities (17.52%), lack of credit to farmers (17.16%), inadequate inputs (14.24%), pests/diseases (12.78%), and high cost of labour (11.67%). These are the major problems reported by the farmers in the study area. Some previous studies on food crops production and marketing pointed out that inadequate marketing infrastructures, adversely affected marketable output, (Onuk, *et al.,* 2010 and Mohammed *et al.,* 2010). Other problems are poor transportation, inadequate technical knowledge due to low level of extension contact with the farmers and extremes of weather events such as torrential rainfall and spell of drought. Moreover bad roads, low extension contacts with farmers and poor credit access to farmers are some constraints to agricultural produce marketing (Kindie, 2007; Abraham, 2013; Christopher, *et al.,* 2014).

Table 3: Constraints to Marketable surplus of Maize

Item	*Frequency	Percentage
Inadequate storage materials	48	17.52
Inadequate credit	47	17.16
Inadequate inputs	39	14.24
Pests/Diseases	35	12.78
High cost of labour	32	11.67
Poor transportation	26	9.48
Extremes of Weather conditions	24	8.76
Low level of extension services	23	8.39

*Double response recorded

Source: Field Survey data, 2017

CONCLUSION

The study found out that maize farming in the area was on small scale holding and a farmer's interest basically was to satisfy the consumption needs and requirements for the next year's planting. However, the farmers were willing to sale the excess or marketable surplus especially during harvest period if buyers offer good prices. Generally, maize production is a profitable enterprise in the study area. The methods of cultivation and processing of maize were un-mechanized which contributed to need for hired (unskilled) labourers at increasing cost. Availability of credit, farm inputs, storage facilities, extension contacts, large farm lands etc, were quite limited to farmers. These problems seemed to discourage the farmers to produce beyond or in excess of their consumption needs. The prevailing condition if not checked could elude urban consumers and local industries the required marketable surplus of maize.

Therefore, the study recommends that maize farmers should be encouraged by providing them improved planting materials, adequate farm inputs at subsidized prices, sources of credit at reduced interest rates, mechanized method of cultivation, with means of irrigation to ensure cultivation of maize twice a year due to limited land and well trained extension officers should have regular contacts with the farmers to teach them improved methods of maize cultivation. These measures would attract more farmers to maize production enterprise, increase marketable surplus and possibly encourage commercialization of the enterprise.

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