

*Full Length Research Paper*

# **Net income analyses of maize agribusiness in Wukari Taraba State, Nigeria**

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The study was carried out to ascertain effects of agribusiness functions and experience on small scale maize agribusiness operators' net income in Wukari, Taraba State, Nigeria. A purposive sampling was used to select four area-markets namely Rafin-Kada, Gindin-Doruwa, Bantaji and Kente markets, where maize agribusiness owners predominantly carry out production and marketing of maize grain. Fifteen small scale maize agribusiness operators were randomly selected from each of the four areas, making a total of 60 operators as representative sample. Interview method and questionnaire was used to illicit response from respondents. Regression results reveal processing, packaging, in addition to sales volume have positive significant influence on operators' net income, while grading, storage, and transportation functions had positive experience had negative insignificant effect. Model summary shows R-square as 0.969, and adjusted R-square is 0.939 yielding an average R-square of 0.954, implying that 95.4% of the variations in the net incomes of the maize entrepreneurs were explained by the exogenous variables. Results of ANOVA reveal a significant model with  $P = 0.000$ , and  $F^*_{Cal} 97.78 > F^*_{tab} 1.77$ . Null hypothesis ( $H_0: b = 0$ ) is rejected and the alternative hypothesis ( $H_A: b \neq 0$ ) accepted since not all the exogenous variables have zero effects. Despite regulating grading, storage, transportation, and financing functions to improve production and sales volume; processing, packaging and sales functions are recommended major criteria for incentive provision by stakeholders given their overriding effects on net income cum shelf life improvement. The study concludes that maize agribusiness is profitable in the study area.

**Key words:** Analyses, maize agribusiness, net income, agribusiness functions, experience.

## **INTRODUCTION**

Maize agribusiness refers to a sector that encompasses farming and farming-related commercial activities. Put differently, the business involves all the steps required to send an agricultural good to market, including production,

processing and distribution. Maize is the second most cultivated crop in Nigeria in terms of area harvested, while Nigeria is the second largest maize producer in Africa, after South Africa (Sahel, 2017). It is an important

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component of the economy in a country like Nigeria with arable land, because the produce can be exported to earn foreign exchange (Chen, 2019). In beginning a maize agribusiness, an operator first finds suitable and arable land. As a handy plant, maize can be grown successfully in variety of soils ranging from loamy sand to clay loam. However, soils with good organic matter content having high water holding capacity with neutral pH are considered good for higher productivity. Fertile well-drained alluvial or red loams free from coarse materials and rich in nitrogen are the best soils for its successful growth (Maize production, 2003). The prevalence of these soil requirements in the northern part of Nigeria, especially in the states of Taraba, Kano, Kaduna, Bauchi, Gombe, Adamawa and Jigawa constitute a landmark for higher cultivation of the crop in these areas (Srikanth et al., 2017).

Hitherto, Kohls and Uhl (1990) classified the functions involved in agricultural and food marketing processes under three sets of functions, including exchange functions comprising buying and selling, physical functions, comprising storage, transportation, processing, standardization, financing; and facilitating functions consisting of risk bearing, and market intelligence. Performing each of these functions add value to the product, though require inputs that translates to costs. The ability of the operator to carry out the required functions by adding positive values to the product make an enterprise remain competitive and profitable leading to most firms, entrepreneurs or operators' constant supply of the good/service. Besides, Ghafoor et al. (2017) refer agricultural marketing to all activities which add value to agricultural products as they move from areas of agricultural production to ultimate consumption points. By extension, marketing of agricultural product/produce involves the task of performing the associated agribusiness functions in any given agribusiness venture, leading to the fulfilment of customers' needs and improving net income of stake operators may include, but limited to those performed by a group of industries or entrepreneurs concerned with holders. The functions carried out by agribusiness agricultural produce and services such as assemblage of these goods, storage, transportation, processing, grading, financing among

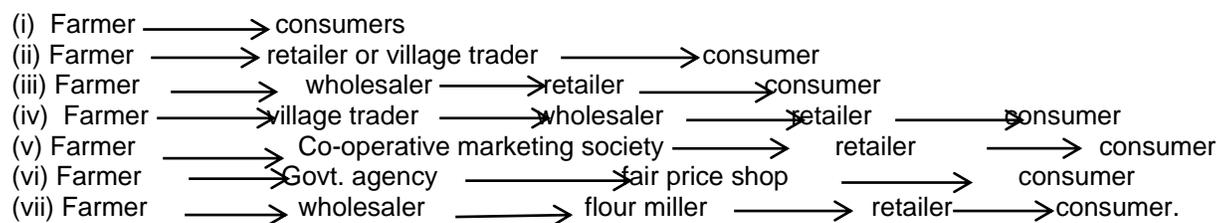
other activities/functions. Agricultural marketing system also relates to economic growth of the agricultural sector by ensuring safe and affordable food to consumers, both of which are directly linked to the food security of any country (<https://www.gktoday.in/gk/marketing-of-agricultural-produce-overview/>).

Most producers do not sell their goods directly to the final users, but via a set of intermediaries performing a variety of functions. These intermediaries constitute a distributing channel. They are the pathway a product or service follows after production, leading to purchase and consumption by the final users (Ozor and Nwankwo, 2018). Channels of distribution consist of a set of independent organizations involved in making a product or service available to the end users directly and indirectly.

Although goods and services pass through the marketing channels of distribution, but the perishability of farm produce compel farmers to make use of direct distribution channels. Also, since majority of farmers reside in rural areas and are separated from their customers, they also make use of the indirect marketing channels (Imam et al., 2014).

The channels through which sales of agricultural produce are actualized vary from commodity to commodity, and area market to area market. In rural markets, trade is characterized by direct sales of small quantities of produce by producers to village traders and by retailers to rural consumers (Yagana et al., 2014). Greater quantities of produce are channeled into larger rural markets, either by the producers themselves or by traders. These "assembly" markets provide sales and purchase opportunities for traders or collection agents on their own behalf or on behalf of urban wholesalers. Marketing by terminal wholesalers and semi-wholesalers takes place within or near major cities (usually with populations exceeding 0.5 million), but the extent to which this can be done depends primarily on the general state of development of the economy and the demands of consumers (<http://www.fao.org/3/x4026e/x4026e03.htm>).

In line with the opinion of FAO (<http://elearn.luanar.ac.mw/repoz/AECO242/lec03.pdf>) presents an adaptable flow chart of the general marketing channel of food grains in India thus:



Problems arise because, maize agribusiness seems lucrative, but the risks associated with growing and marketing maize often left operators complaining, not only due to decline in prices, but customers not attracted

to their goods, linked to arrival of imported crop type. Again, maize production is sensitive to drought that may lead to the crop failure and famine. Besides, Nigeria has gradually moved to a system where agribusiness

operators' produce, process, grade, package, transport, store and sell Maize produce to consumers, and away from a system that involves marketing boards. These changes have given rise to the performing cost-incurring agribusiness activities/functions often of considerable magnitude

(<http://www.fao.org/3/W3240E/W3240E12.htm>), which have great effect on net income of Maize agribusiness.

Despite high production volumes, Nigeria's average maize yield of 11.136 MT between 2015 and 2019 was low among the top producers in various regions of the world. In Africa, it lags behind South Africa with a yield of 12.26 MT within the same period (FAO, 2015). It is hoped that by addressing low yield issues, Nigeria could become the largest maize producer in Africa and one of the largest producers in the world without necessarily increasing the area currently used for its cultivation. Besides, in Nigeria, the 2019 Maize harvest was 12.7 million tonnes, which was 18% above average. However, despite the above-average aggregate production, several localities experienced production shortfalls due to pockets of drought during June-July, flooding in September as well as Fall Armyworm infestations on maize crops (FAO, 2020). More so, low levels of domestic production of maize occasioned by poor quality seeds and fertilization have effects on the quality of the harvested crop, while quality and cob size affect farm gate prices (Kitinoja et al., 2019). And length of market channels increase transport cost among other factors that hinder effective marketing of Maize (Ayoola and Azever, 2010; Onu and Iliyasu, 2008), thereby influencing not only the net income of the agribusiness operators, but other marketing intermediaries of maize grains.

This study provides information on the stress variables influencing maize agribusiness significantly, which would guide the unemployed youths that may venture into the business to earn livelihood. In these regards, commercial maize farming will improve production by overcoming all bottlenecks to enhanced net income. Through checkmating the factors militating against commercial maize production, food security status of Nigeria will equally be improved. Again, private-sector investment and involvement in strengthening all points of the agricultural value chain is crucial to achieving a sustainable boost to productivity (European Union, 2013). More so, Nigeria's maize annual production in 2019 stood at 12.76 million metric tons while the annual maize consumption estimate stands at 11.4 million metric tons, creating a gap of over 400,000 metric tons of Maize which is made up for by importation. The projected demand for 2020 is that the country will need an additional 100,000 metric tons of imported Maize to augment local production amid the disruption of business activities and the restriction of movement across the country in the first quarter of 2020, culminating to reduction in maize cultivation, processing and distribution

(FAO, 2020). Again European Union (2013) asserted that there has been increasingly large gap between regional demand and supply, and between regional supply and global demand. These are evidence that maize agribusiness among others is conducive to the development of a nascent African agri-food sector that can deliver significant returns on investment by maize agribusiness/entrepreneurs. Maize is very important and good source of minerals, vitamins, fiber and oil for human and animals alike (Bushra et al, 2019). The starch serves as diluents in pharmaceutical industries and cosmetics. While seeds are used in making alcohol, small scale farmers engage in maize farming, due to its high nutritional values and affordable source of vitamins and minerals for people living in rural areas.

Besides, available research works are on costs and returns, comparative analysis of comprehensive (gross) and net income and maize marketing, which did not take into account effects of agribusiness functions on the operators' net income, as carried out in this study, and wherever available, vary in aspects and scope. Bataineh and Rababah (2016) compared the ability of comprehensive income and net income to predict companies' future performance in emerging markets by studying industrial companies in Jordan. Urassa (2015) worked on factors influencing maize crop production at household levels: A case of Rukwa Region in the southern highlands of Tanzania. The article mainly examined households' socio-economic characteristics affecting maize production in Rukwa in the context of the market reforms carried out in Tanzania in the mid 1980's, rather than commercial maize production and effects of the activities/functions performed by commercial operators on net income of the business

The main objective is to investigate the effects of agribusiness functions and experience on small scale maize agribusiness annual net income in Wukari local government area of Taraba state, while the specific objectives are to:

- (i) Identify agribusiness functions performed and experience of small scale maize agribusiness operators in the study area;
- (ii) Evaluate the variable and fixed costs, net income, as well as average net income of the studied clientele;
- (iii) Determine the effects of agribusiness functions and experience of small scale maize agribusiness operators' net income.

### Hypothesis

1. The null hypothesis tested,  $H_0$ : Experience cum cost of carrying out agribusiness functions do not significantly influence net income of small scale maize agribusiness in the study area.
2. The alternative tested,  $H_A$ : Experience cum cost of carrying out agribusiness functions significantly influence

net income of small scale maize agribusiness in the study area.

## MATERIALS AND METHODS

Net income analysis used in evaluating the profitability of maize agribusiness venture ascertained the net accruals after deducting fixed and variable costs to business. The computation of the annual net income adopted procedures of related schools of thought (James and Patrick, 1988), presented as  $NFI = GR - \text{Total cost}$ . The net income was calculated by subtracting total expenses from total revenues. All revenues and expenses are properly substituted in the adopted formula stated thus:

$$NI = TR - TC$$

Where: NI = Net income of the agribusiness operator (₦), TR = Total revenue realized from Quantity Sold (₦) and TC = Total cost of performing the Agribusiness functions (₦),

Multiple regression analytical technique used evaluated the relationship between independent variables  $X_1, X_2, \dots, X_n$ , referred to as operators experience cum agribusiness functions and the dependent variable Y, referred to as the net income of the maize agribusiness operators. The implicit form of the regression model that was used was stated as thus:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8; \mu_i)$$

Where; Y = Maize agribusiness operator's Net income (N),  $X_1$  = Processing Activities;  $X_2$  = Cost of Grading Activities;  $X_3$  = Packaging Cost;  $X_4$  = Storage Cost;  $X_5$  = Transportation;  $X_6$  = Quantity Sold;  $X_7$  = Financing;  $X_8$  = Maize Agribusiness Experience;  $\mu$  = Error Term

The model is expressed explicitly as:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + \mu_i$$

### Study area

The study was conducted in Wukari Local Government Area of Taraba State (Figure 1). Wukari Local Government has been the headquarters of the historically famous Kwararafa Confederacy which at the zenith of its powers extended to modern Niger, Plateau, Kogi, Nasarawa, Benue States and FCT in the north central geo-political zone, Edo and Cross River in the South- South zone, Kaduna, Kano and Katsina States in the north west zone and Bauchi, Gombe and Adamawa States in the north east zone (Wikipedia, 2020).

### Sampling procedure

The study was conducted in Wukari Local government Area, Taraba State, Nigeria. A purposive sampling method was used to select four area-markets where maize grains are predominantly produced and sold by agribusiness operators. These areas include Rafin-Kada, Gindin-Doruwa, Bantaji and Kente. For each of the four areas, fifteen Small Scale Maize Agribusiness Operators were randomly selected for interview, making a total of 60 respondents.

### Data collection

The study was conducted using primary data collected through the

use of structured questionnaires administered to the respondents. The questionnaire was structured to enable collection of data to achieve the objectives of the study. Also, secondary information gathered was infused accordingly to enrich the study.

### Data analysis

Data collected were analysed according to objectives, using descriptive statistics such as percentages to achieve objective (i). While Objective (ii) was achieved using net income analytical procedure, and multiple regression analysis was used to achieve objective (iii).

## RESULTS AND DISCUSSION

The result presented in Table 1 x-rays the percentage of variable costs, fixed costs, and net income to total revenue of maize agribusiness ventures studied. Also, the details of the regression analysis showing magnitude of significant and insignificant coefficients among other effects of included variables are presented hereunder as regression output, ANOVA, model summary (Tables 2 to 4, respectively).

Profitability analysis shows how much revenue would be left over after all expenses have been paid by an agribusiness entrepreneur. Many agribusiness operators are required to meet certain profits each year in order to maintain loan covenants with their lenders. These covenants present a problem to agribusiness operatives, as they need to show more profit to meet lender's requirements. Agribusiness operators and firm management focus on the net income calculation because it was a good indicator of the business's financial position and ability to manage investment efficiently. Obviously, higher profits are always preferable to lower profits. Businesses can use higher profits to reinvest in expansion, eliminate debt, and even make payments to their workers (Olayinka and Aminu, 2006). The efficiency in carrying out the required agribusiness functions such as assemblage of these goods, storage, transportation, processing, grading and financing by an experienced agribusiness operator determines volume of net income and business viability/profitability.

Table 1 depicts the percentage of total variable cost to total revenue as 5.64%, which represents that value taken up by variable costs for performing agribusiness functions among which are assemblage of the goods, storage, transportation, processing, grading, and financing. On the other hand, fixed costs such as farm buildings, land, and equipment gulped up 36.55% of the agribusiness total revenue accruals within the period of the study area. The percentage net revenue of 57.81% indicates the total net returns to maize agribusiness ventures in the study area after all expenditures have been deducted. Given an annual net income and average net income of ₦ 26,915,945 and ₦448, 599.083 respectively, it suffices to state that maize agribusiness is

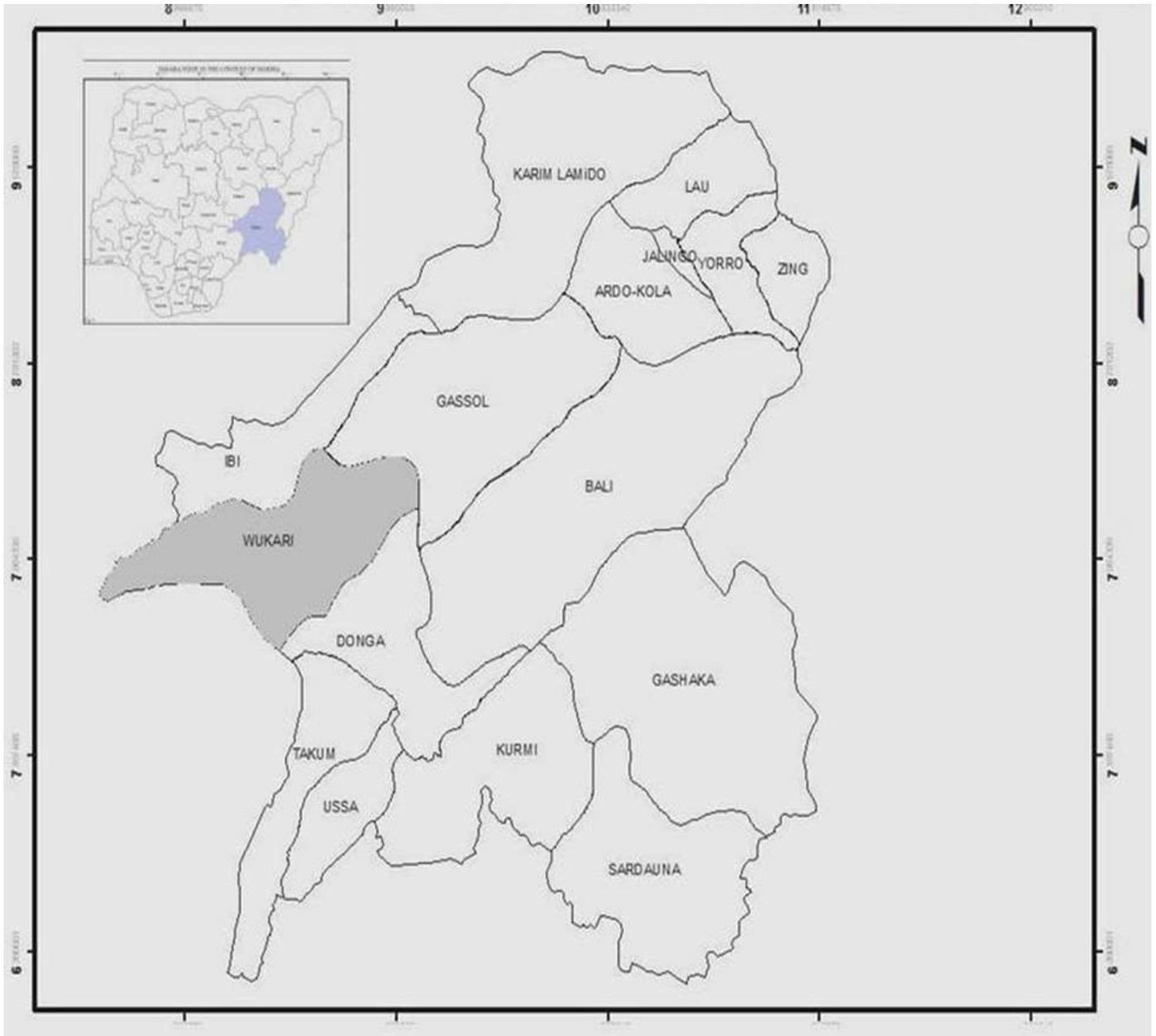


Figure 1. Map of Taraba State showing Wukari L.G.A (Oko et al., 2014).

Table 1. Percent of costs and net income to the total revenue in maize agribusiness.

Items	Item value (₦)	Item value percent (%) of total revenue
Total variable cost	2,625,055	5.64
Total fixed cost	17,016,660	36.55
Total cost	19,641,715	42.19
Net income	26,915,945	57.81
Average net income (per operator)	448,599.083	
Total revenue	46,557,660	
Maize agribusiness experience	12.3 (Years)	

Source: Field Survey, 2018.

**Table 2.** Regression output: Effects of agribusiness functions on operators' net income.

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	Beta		
(Constant)	9246.216	33799.861		.274	.786
Processing cost	14.181	4.770	.186	2.973	.004*
Grading	4.554	3.373	.109	1.350	.183
Packaging	7.340	3.507	.174	2.093	.041**
Storage	1.086	2.171	.035	.500	.619
Transportation	1.292	2.838	.017	.455	.651
Sales	.326	.051	.557	6.410	.000*
Financing	.260	.246	.092	1.055	.296
Maize agribusiness experience	-4808.894	3188.002	-.104	-1.508	.138

a. Dependent Variable: Net Income.

Source: Regression Output, Field Survey, 2018; \* = Significant at 1%; \*\* = significant at 5%.

**Table 3.** ANOVA.

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	11081061359947.912	8	1385132669993.489	97.781	.000 <sup>b</sup>
	Residual	722445633126.668	51	14165600649.543		
	Total	11803506993074.580	59			

a. Dependent Variable: Net Income; b. Predictors: (Constant), maize agribusiness experience, transportation, processing activities cost, storage, financing, grading, packaging, sales.

Source: Regression ANOVA, Field Survey, 2018.

**Table 4.** Model summary.

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.969 <sup>a</sup>	.939	.929	119019.329

<sup>a</sup>Predictors: (Constant), maize agribusiness experience, transportation, processing activities cost, storage, financing, grading, packaging, sales.

Source: Regression Model Summary; Field Survey, 2018

profitable in the study area. This finding is consistent with Bataineh and Rababah (2016) results which noted that even though total comprehensive income possesses more informative content and gives further information, the net income is more powerful in predicting future performance of a business venture. Table 2 presents the result of regression analysis, x-raying exogenous variables that influence the clientele's net income. The variables found to have positive significant influence on the net income of maize agribusiness operators in the study area include, processing, grading, and sales (Table 2). The implications of the regression output are as discussed subsequently.

### Processing

The coefficient of effect of processing on the net income of maize agribusiness is 14.181, while the standard error

is 4.77. The coefficient is positive and highly significant at 5% level of significance. The implication of this scenario is that net income of business operators increases by 14.18 units for every unit increase in processing, all things being equal, as against specified units for other significant and insignificant variables. This is good, considering the importance of processing in value chain addition of every production venture.

### Packaging

The coefficient of effect of packaging of maize produce on net income of the agribusiness operators is 7.34, with a standard error of 3.507. This coefficient is also positive and highly significant at 5% level of significance. This implies that for every one unit increase in packaging quality, net income of maize agribusiness operators would increase by 7.34 units, all things being equal.

## Sales

As shown in Table 2, the coefficient of sales quantity is 0.326, while the standard error is equal to 0.051. These are positive and highly significant at 1% level of significance, implying that every one unit increase in sales will lead to 0.326 unit increases in net income of the maize agribusiness in the study area, all things being equal. The agribusiness functions that have negative and insignificant influence on operators' net income are grading, storage, transportation functions, in addition to experience in maize agribusiness. Besides, the result of ANOVA in Table 3 reveals that the model is significant with  $p = 0.000$ . Again, the  $F^*_{Cal} = 97.78$  is greater than  $F^*_{tab} 1.77$ , thus, the null hypothesis, experience cum cost of carrying out agribusiness functions do not significantly influence net income of small scale maize agribusiness in the study area ( $H_0: b = 0$ ) is rejected and the alternative hypothesis ( $H_A: b \neq 0$ ) accepted since not all the variables have zero effects (Table 3). More so, processing, packaging and sales quantity have positive and significant influence on net income of maize agribusiness in the area. Therefore, given the results of Table 2, the explicit functional form of the estimated regression equation is given as:

$$Y = 14.181X_1 + 7.340X_3 + 0.326X_6 + \mu_i.$$

The choice for the equation is a function of priori expectation of fulfilling economic, statistical and econometric criteria with respect to the signs, magnitude and significance of the regression coefficients.

The model summary in Table 4 show that the R Square is 0.969, while the adjusted R square is 0.939, yielding an average R square of 0.954. The implication of this is that on the average, 95.4% of the variations in the values of endogenous variable Y (net income of agribusiness operators) were explained by the exogenous or explanatory variables  $X_i$  included in the model (Table 4)

## Conclusions

In the underlying net income analyses, total variable costs stood at ₦2,625,055; total fixed costs (TC) of ₦17,016,660; yielding a total cost (TC) of ₦19,641,715 and a net income of ₦26,915,945 which translates to an annual average net income (NI) of ₦448, 599.08 per respondent. This implies that small scale maize agribusiness in the study is profitable. The result of the regression analysis had an average  $R^2$  value of .954 which means that 95.4% of variations in dependent variable (Y) was explained by the explanatory variables ( $X_i$ ). Besides, since the  $F^*_{Cal} = 97.78$  is greater than  $F^*_{tab} 1.77$ , and the null hypothesis  $H_0$ : Experience cum cost of carrying out agribusiness functions do not significantly influence net income of small scale maize

agribusiness in the study area is rejected since three of the explanatory variables, processing, packaging, and sales (Table 2) have positive significant influence on the net income of maize agribusiness in the study area. The study concludes that maize agribusiness functions influence the operators' net income, and are profitable enterprise in the study area. This conclusion is in tandem with the results of the study of Kolawole (2017) that analysed the costs and returns on maize production among small-scale farmers in Osun State Nigeria, where the gross margin was estimated to be ₦638,465.22 with a benefit-cost ratio (BCR) of ₦1.74, implying profitable venture. The current decision of the central Bank of Nigeria (CBN) to discontinue the issuance of Form M to importers of Maize/Corn will likely roll back the gains of the intervention in the sector. There is no doubt that current prices of maize will continue to rise to reflect its current scarcity, leading to the depletion of corn grain reserves of last season and shortage in supply. The situation spells doom for poultry farmers across the country, and will likely lead to cut down on production occasioned by high cost of feed and imported medication. A negative spill over effect of the high cost of feed is the scarcity of eggs and broiler meat, cum a consequent rise in the price of eggs across the country. The implications of the current challenges in the maize value chain are that the gains of employing more people in the agricultural sector will be rolled back in the coming months (The Sun, 2020).

Based on the findings, the following recommendations were made:

1. Young and educated unemployed in the area should engaged in maize agribusiness as means of livelihood given the profitability of the venture.
2. Grading, storage, transportation, and financing functions should be regulated to improve production and sales volume given the positive insignificant effects on agribusiness net income in study area.
3. Processing, packaging and sales volume should be major criteria for incentive provision by Government and or NGO stakeholders given the overriding positive significant effects on agribusiness net income in the study area.
4. Experience in maize agribusiness should be considered a pivotal factor though had insignificant, but an overwhelming negative influence on net income.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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