



**EMPIRICAL ANALYSIS OF PRODUCTIVITY AMONG AGRI-FOOD
ENTREPRENEURS : EVIDENCE FROM RICE PROCESSORS
IN EBONYI STATE, NIGERIA**

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Abstract

Productivity has been identified to be abysmally low in many agri-food enterprises. This study is an attempt to distil the factors that influence total factor productivity (TFP) among rice processors in Ebonyi State, Nigeria. Data were collected with the use of a structured questionnaire, administered to one hundred and twenty respondents, who constitute the sample size for the study. Data analysis estimated total factor productivity index and presented descriptively and use of the ordinary least square regression model. It was observed that 51% of the processors had productivity of 1.50 to 1.74 and the least (2%) from 1.00 to 1.24. An average value of 1.53 implies that an average rice processor made about 53 kobo for every one naira invested. The double-log form was chosen as the lead equation indicating coefficients of age, education, firm size, extension and credit directly related to productivity, while gender, household size, capital inputs and experience were negative. The study therefore call for policies aimed at training and re-training of rice processors and provision of credit at no or free interest rates to improve productivity from the current average of 1.53 to avoid being in a productivity trap. This requires support and incentive from government and other international donors to design programs for improved capacity of rice processors. There is also need for free or affordable training to enable processors access and process information on innovations on rice processing for enhanced productivity.

Keywords: Agri-food, Enterprises, Rice, Processors, and TFP

Introduction

The agri-food industry is strategic to achieving global food security agenda by the year 2030. However, studies such as Oteh (2017) has identified that this industry suffers from low productivity due to convergence of factors which are mostly man-made and environmental limiting agricultural and its allied industry productive capacity, competitiveness and marketing. This scenario is particularly disturbing for the rice industry, which is a key block in meeting the food demand of Nigerians. The importance of rice in the diet of Nigerians has been significant as its consumption has continued to outstrip other staple foods. From the mid 1970's, rice consumption rose significantly as a result of accelerating population growth rate estimated at 2.8% per annum (Akpokeje *et al.*, 2009). Agwu and Ibeawuchi (2010) noted that at Nigeria's independence in 1960, rice was merely a festival food consumed mostly in affluent homes at Christmas and during other religious festivals. The trend has changed especially since the mid 1970's. Today, rice is one of the few food items whose consumption has no cultural, religious, ethnic or geographical boundary (Ibitoye *et al.*, 2014). It has been estimated that Nigeria consumes five million metric tonnes of rice annually (Business Day, 2014). Therefore, with increase in population, rice will continue to have high market potentials. Unfortunately, most rice consumed in Nigeria and other developing

countries are imported due partly to inability of processors to meet local demand and value addition preference among other factors.

Part of the reasons for local productive capacity of processors and producers to meet demand has been attributed to low productivity that characterized agri-food industries and general agricultural development in Nigeria (Nwajiuba, 2013; Obasi, 2000). The issue of low productivity borders on how those factors that explain production efficiency could be addressed to improve both production and utilities. The major factor mentioned in this context is finance and/or adequate (working) farming capital to optimize production and effectively drive agricultural growth. For instance, a study on sources of total factor production growth in 83 industrial and developing countries for the period 1960-1990 showed that finance formation was three to four times more important than raw materials in explaining output growth of these enterprises (Nehru and Dhaheshwars, 1994). This current study shares a similar scenario, hence credit was included as part of the factors to establish link with productivity. This is because finance is often mentioned in the context of agricultural enterprises and production (Oteh *et al.*, 2016)

Although about 15 large integrated rice processing

plants were birthed through agricultural transformation agenda in 2015 (FMARD, 2013), other evidence has shown that many rice processors in Ebonyi State, are small scale processors with low productive capacity limiting their ability to compete effectively (Osondu *et al.*, 2015). This has implication in meeting demand for rice and achieving other Sustainable Development Goals (SDGs). Therefore, this study is an attempt to examine productivity within a broader perspective than a set of repetitive discrete transaction that characterized previous attempts. The idea behind this study is to provide a fulcrum to address challenges of rice production given government directive banning importation of foreign rice. It provides another attempt to identify factors that will serve as enablers to rice pillars. Without these enablers, it may be difficult to achieve the desire of Nigeria to be self-sufficient in rice production.

Methodology

The study was conducted in Ebonyi State of Nigeria. Ebonyi State has three agricultural zones: Ebonyi Central, Ebonyi North and Ebonyi South. Each of these zones is made up of four Local Government Areas (LGA), except Ebonyi South, with five LGAs. The state has a population of 2.9 million (NPC, 2016). For the ease of data collection, a multi-stage sampling technique was adopted for the selection of respondents and locations. In the first stage, two LGAs were randomly selected from each of the three agricultural zones, making it a total of six LGAs. In the second stage, twenty rice processors were randomly selected from each of the LGAs giving a total of one hundred and twenty rice processors for detailed study. Data was obtained with the aid of structured and pretested copies of questionnaire administered to the respondents. Also, personal interviews were conducted to ascertain other characteristics of interest. TFP index was estimated with the ratio of total value of rice processed to total variable/input costs used in processing thus:

$$TFP = \left(\frac{\text{total output (₦)}}{\text{total input (₦)}} \right) \dots\dots\dots (1)$$

The Ordinary Least Square (OLS) analytical method was used to estimate the effect of some variables on TFP among the rice processors in the study area following Okoye *et al.* (2008).

$$TFP = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}) + e \dots\dots\dots (2)$$

Where,

$$TFP = \left(\frac{\text{total output (₦)}}{\text{total input (₦)}} \right)$$

- X₁ = Age of processors (years)
- X₂ = Gender (male = 1, female = 0)
- X₃ = Years of education (years)
- X₄ = Household size (number of persons living in the same house)
- X₅ = Processing experience (years)
- X₆ = Firm size (number of employees)
- X₇ = Extension contact (number of contacts)
- X₈ = Volume of credit (N)
- X₉ = Capital inputs (N)

X₁₀ = Distance to market (Km)

Results and Discussion

The socio-economic characteristics of the rice processors are shown in Table 1. Results show that many (42%) of the rice processors are between the age range of 25-34 years with mean age of 42 years. The result therefore indicates that many of the processors are still young and energetic, since they are in their active age. Thus, labour productivity of the rice processors are expected to be high. The result conforms with the findings of Adebayo and Oni (2010) who noted that age is one of the socio-economic attributes that affects the level of entrepreneurs' productivity. Majority (60%) of the respondents are females. This implies that rice processing in Ebonyi State, Nigeria is mainly dominated by females. The result agrees with the study of Odii (1992), who observed that females contribute significantly to agricultural production. The result also revealed that 24% of the sampled rice processors were single and 67% married, while 6% and 3% were widowed and divorced respectively. The high percentage of the married in the study area is an advantage to the entrepreneurs who will utilize family labour and spend little or less on hired labour. This result further suggests that rice processing is best practiced by the married who are relatively settled since rice is a major staple food in the study area. These processors are better positioned to do serious business when they are stable. This stability create conducive environment for development of personal integrity and entrepreneurship (Nwaru, 2004). The dominance of the married in farming in the area may be because married people are more settled as it relates to giving appropriate attention to farming operation. Mtama (1997) found that marriage has an effect in production process as it increases labour availability in the household. Majority of the rice processors (86%) have household size of 4 – 6 persons, while 8% and 6% have 7 – 9 and 1 – 3 persons respectively with an average 5 persons. This implies that the respondents' large family size is above the recommended average size of four (4) per family in Nigeria. Family labour is recognized as a source of labour supply in smallholder enterprises in most part of Africa with Nigeria inclusive. However, the relative large family size is an added advantage to the households who would maximize family labour and possibly channel the extra money for hired labour to other family expenditures thereby increasing living standards. The result also showed that 9% of the rice processors in the area never attained any form of formal schooling, while 34% attained secondary school and about 31% attained higher Institution at various levels. The average level of years of schooling was about 13 years. Majority (89%) of the respondents had contact with extension services in the study. Adewuyi (2002) reported that the efficiency level of entrepreneurs was significantly affected by extension services. The result showed that many (44%) respondents have been into rice processing for about 11 – 20 years while 43% have been into the business for 21 – 30 years. Only about 10% and 3% have processing experience range of 31 – 40 and 1 – 10 years respectively with average processing experience of 19 years. This implies that rice processing

is an age long business in Ebonyi state as the people are predominantly rice farmers. They have acquired long years of experience in rice processing; therefore, adoption of new innovations will be enhanced. Majority (72%) belong to cooperatives while 28% do not.

Cooperative membership affords members the opportunity to enjoy certain benefits, financial and market related. They secure credit at very cheap rates and sell their produce with larger market access, command better profits, efficiency and productivity.

Table 1: Distribution of respondents by socio-economic characteristics

Variables	Frequency (f)	Percentage (%)	Mean/Mode
Age (in years)			
25 – 34	50	42	
35 – 44	25	21	
45 – 54	15	12	
55 – 64	22	18	
65 and above	8	7	
Total	120	100	42 years
Sex			
Male	48	40	
Female	72	60	
Total	120	100	Female
Marital status			
Single	29	24	
Married	80	67	
Divorced	3	3	
Widow	7	6	
Total	120	100	Married
Household size			
1 – 3	7	6	
4 – 6	104	86	
7 – 9	9	8	
Total	120	100	5 persons
Level of education			
No formal education	11	9	
Primary education	31	26	
Secondary education	41	34	
Tertiary education	37	31	
Total	120	100	Secondary
Years of education			
1 – 5	17	14	
6 – 10	15	13	
11 – 15	47	39	
16 – 20	41	34	
Total	120	100	13 years
Years of experience			
1 – 10	3	3	
11 – 20	53	44	
21 – 30	52	43	
31 – 40	12	10	
Total	120	100	19 years
Cooperativer membership			
Yes	86	72	
No	34	28	
Total	120	100	Yes
Extension contacts			
Yes	107	89	
No	13	11	
Total	120	100	Yes

Source: Field survey, 2018

The TFP of the rice processors is their ratio of total output to total inputs used in the production process. In this case, the ratio of the output and

inputs prices was estimated. The result is presented in Table 2.

Table 2: Total Factor Productivity of rice processors in Ebonyi State

Productivity distribution	Frequency	Percentage (%)
1.00 – 1.24	2	2
1.25 – 1.49	53	44
1.50 – 1.74	61	51
1.75 – 2.00	4	3
Total	120	100
Minimum	1.09	
Maximum	1.96	
Mean	1.53	

Source: Field survey data, 2018

Majority of the processors (61%) had productivity of 1.50 to 1.74 and the least (2%) from 1.00 to 1.24. An average value of 1.53 implies that an average rice processor made at least about 53 kobo for every one naira invested. Using productivity as an index for performance, it would be stated that majority of the rice processors in Ebonyi state are performing well although there is still enough room for improvement. This result also suggests that with the right resource use and access to capital, rice processors will do better.

Determinants of productivity among rice processors in the study area

The result of the OLS regression analysis on the factors influencing productivity of rice processors is presented in Table 3. The double log form was chosen as the lead equation based on a higher R^2 value, number of significant factors and *a priori* expectations. The F-ratio was statistically significant at 1% probability level indicating goodness of fit of the regression line. The R^2 of 0.728 implies that a 72.8% change in the productivity of the rice processors was accounted for by changes in the independent variables while the remaining 27.2% was accounted for by random disturbances. The coefficient for age was positively related to TFP and significant at 1%, implying that a 1% increase in the age of the respondents will lead to a 0.18% increase in TFP. The increase in age could make them to have had a mastery of the rice processing activities in the aspect of management and resource utilization (Osanyinlusi and Adenegan, 2016). Old age might pose a disadvantage to processing activities but older processors most times are more experienced.

The result also showed that education was positively related to the TFP of rice processors and significant at 1% level, implying that as the processors acquired more

education, they had better processing output. This also implies that as the number of years spent in formal education increases, it makes the rice processors more productive (Osanyinlusi and Adenegan, 2016). This suggests that higher literacy level influenced the rice farmers' productivity positively in the study area. Education helps to unlock the natural talents and inherent enterprising qualities (Nwaru, 2004) of the entrepreneurs, thus making them more skilled and more responsive to risk taking and change than the illiterate farmers (Xaba, 2013). This conforms to the findings of Kehinde (2005) and Idjesa (2007) who noted that education was key to enhanced productivity among farming households in the humid forest, dry savannah and moist savannah agro-ecological zones of Nigeria. Additionally, better education would lead to improved access to knowledge and tools that would enhance productivity (Gul Unal, 2002; Okoye *et al.*, 2008; Ukoha *et al.*, 2010).

Firm size was positively related to the productivity of rice processors at 5% level of significance, implying that with an increase in firm size, productivity will increase. This indicates that as the size of the firm (number of employees) increases, the productivity of the processors in the area increases. This suggests that the bigger a firm is, the higher the productivity. This is in line with the results of Ajibefun *et al.* (2002) who indicated that larger farms had enhanced productivity in the dry savannah and humid forest agro-ecological zones of Nigeria. However, the results from Oni *et al.* (2009) showed that there is a negative relationship between firm size and productivity. This could be as a result of lack of capital and other resources to improve or enhance productivity. The differences in years could have altered the result hence the current findings.

Table 3: Determinants of productivity of rice processors in Ebonyi state

Variables	Linear	Exponential	Semi-log	Double-log (+)
(Constant)	.965 (2.978)***	.864 (2.329)**	.900 (3.249)***	6.679 (3.199)***
Age	-.002 (-.101)	-.170 (-.170)	-.002 (-.200)	.187 (11.000)***
Gender	.041 (1.126)	.388 (1.137)	.013 (.879)	-.138 (-2.286)**
Education	-.017 (-.226)	-.087 (-.195)	.001 (.023)	.432 (3.857)***
Household size	.090 (2.250)**	.266 (.508)	.881 (1.945)*	-.165 (-3.260)***
Experience	-.011 (-.617)	-.294 (-.879)	-.002 (-.233)	-.579 (-4.165)***
Firm size	.000 (.987)	.460 (.531)	6.169E-006 (.095)	.971 (2.697)**
Extension	-9.190E-005 (-2.412)**	-1.056 (-2.619)**	-4.928E-005 (-3.138)***	0.526 (2.007)**
Credit	.002 (.008)	-.211 (-.449)	-.028 (-.307)	.125 (2.638)**
Capital inputs	.587 (2.396)**	.528 (2.104)**	.239 (2.598)**	.217 (-3.660)***
Market distance	.166 (2.049)**	.926 (2.194)**	.302 (1.697)*	.509 (.892)
F-Ratio	4.037***	2.103**	3.481***	6.009***
Adj. R ²	.324	.425	.351	.445
R ²	.554	.602	.672	.728

Source: Field survey, 2018

***, ** and *, statistically significant at 1%, 5% and 10% respectively

Extension contact was positively related to the productivity of rice processors at 5% level of significance implying that processors with more and frequent contact with extension agents are most likely to adopt better and modern processing technologies and techniques. The purpose of extension service is to introduce entrepreneurs to new and improved inputs and better methods of improving processing and productivity and in turn increase marketable supply. This further suggests that rice processors experienced higher productivity as more contacts were made with extension agents/ services in the study area. This confirms with the studies of Adewuyi (2002), Ajani (2000), Amaza (2000), Awotide (2004) and Osanyinlusi and Adenegan (2016) who noted that extension services enhanced entrepreneurs' productivity in Nigeria. Ukoha *et al.*, (2010) indicated that increased extension contacts would lead to more knowledge on improved technologies which have a strong influence on increased productivity.

The coefficient of credit was positively related to the productivity of rice processors and significant at 5% level. This implies that the more micro-credit support is given to rice processors, the more productive they will become. According to Dadzie and Acquah (2012), the financial support will

enhance entrepreneurs' access to technological learning and improved processing inputs that will lead to increased productivity. Access to credit would enhance the financial capacity of the processor to purchase the necessary inputs which have a positive effect on their productivity (Xaba, 2013). Credit facilitates the introduction of innovative technologies and ensures input and output marketing arrangements (Reddy, 1998). It was also assumed to have a positive influence on the productivity of rice processors because having access to credit services to enable them purchase quality varieties and hence increased productivity.

Conclusion

Identifying key issues that affects productivity is important towards commitments to transform market-oriented food system and competitiveness. The study therefore calls for policies aimed at enhanced training for rice processors to improve their productivity to avoid being in a productivity trap. This requires support and incentive from government and other international donors. There is need to make education free or affordable to enable processors access and process information on innovations that will enhance their productivity. The extension system should be overhauled to enable processors access extension and credit at low or no interest rates. Policies should be put in

place by stakeholders in rural development to encourage rice processors in non-agricultural wage and self-employment categories to reinvest off-firm income into rice production and processing. This is because the re-investment would lead to expansion in farm size and output to enable operation in larger markets and go into full agribusiness processing.

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