

ANALYSIS OF COST AND RETURNS IN RICE PRODUCTION BY USAID-MARKETS II PROJECT PARTICIPANTS AND NON-PARTICIPANTS IN EBONYI STATE, NIGERIA

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Abstract: This research work focused on analysis of cost and returns in rice production by USAID-MARKETS II project participants and non-participants in Ebonyi state, Nigeria. Multi-stage sampling procedure was employed to select 239 participants, and 252 non-participants for the study. Data were collected from primary source, and analyzed using Z statistic, Net Farm Income (NFI) and Returns Per Naira Invested (RNI). The result reveals that the Net Farm Income (NFI) obtained by USAID-MARKETS II project participants, and non-participants were ₦493, 067.55/ha, and ₦353, 408. 12/ha respectively while the return on investment obtained by them were ₦3.28k, and ₦3.05k respectively. There was a significant difference between the profits obtained by them. Therefore, this study recommended that the teaming unemployed Nigerian youth should be encourage by the government, and international agencies through provision of grant/loan to take up rice farming as a business.

Keywords: *Comparative Analysis, Profitability, Rice Production, Rice farming households, USAID-MARKETS II project*

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INTRODUCTION

Rice is a very important staple food in Nigeria, and it is cultivated in all the agro-ecological zones in Nigeria. Nigeria is blessed with good climatic, vegetation, and soil conditions suitable for rice production. The demand for rice will continue to grow in Nigeria, due to rapid growth in population (IFPRI, 2016). Nigeria ranked as the highest importer of rice in West Africa, and the second largest rice importer in the world, after Indonesia (Cadoni, and Angelucci, 2013) as cited in (Onyekwena, 2016). Despite many policies made by Nigerian government in the rice sector, rice production has failed to keep pace with the growing domestic demand. In 2014, rice demand was estimated at 5.9 million metric tonnes (MT) while only 2.7 million MT was produced locally, leaving a supply gap of 3.2 Million MT (Sahel Capital Partners & Advisory Limited, 2015). The need to bridge the gap between rice demand, and supply has

led to increases in rice imports. It was reported that Nigeria spent N1billion per day on rice imports in 2013 (Onyekwena, 2016). These necessitated Nigerian government intervention in the rice sector. USAID-MARKETS II is one of such intervention in Nigerian rice sector. USAID is an international agency that provides foreign aids to needy countries. The agency's intervention in agricultural production is known as Maximizing Agricultural Revenue, and Key Enterprises in Targeted Sites (MARKETS). MARKETS worked along the rice value chain in order to improve productivity, income, sales, and jobs at firm, and farm levels (USAID, 2013). USAID MARKETS was initiated in 2005 and designed to expand economic opportunities in Nigeria's agricultural sector. Over time, USAID-MARKETS have grown to provide farmers with assistance such as fertilizer supply, and technology development; seed development, and farmers training (USAID-MARKETS, 2010). USAID

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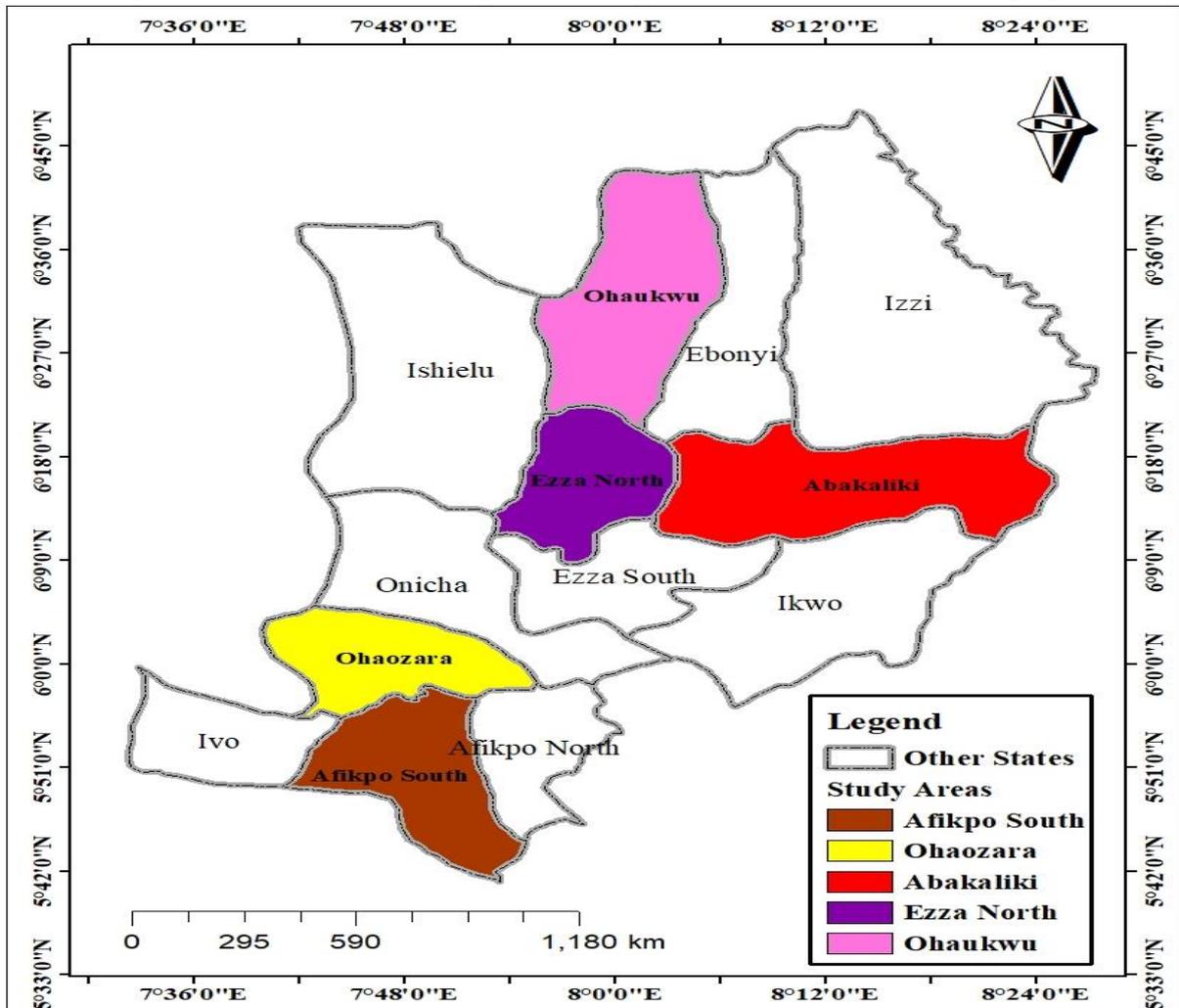
MARKETS II project was initiated to assist rice producers with adequate knowledge, and skills to enhance rice productivity, income, and their well-being (USAID-MARKETS, 2010; USAID-MARKETS, 2014).

Despite the interventions of the Nigerian government in the rice sector, low rice profitability have continued to be a major problem that discouraged the Nigerian farmer from venturing into rice farming. Therefore, this research work aims to analyze the cost, and returns in rice production by USAID-MARKETS II project participants, and non-participants in Ebonyi state, Nigeria, with the intention of discovering better techniques in rice production that could generate more profits for the rice farmers. A null hypothesis which stated that there is no significant difference between the profit

obtained in rice production by participants, and non-participants of USAID-MARKETS II was tested.

METHODOLOGY

The study was conducted in Ebonyi State. Ebonyi state was created in 1996, making it one of the youngest states in Nigeria. Agriculture is a major occupation in Ebonyi State, with an estimated 85% of the population earning their living from one form of agriculture or another. Ebonyi State has a total land area of about 5,935 km² (Obasi, Agbo, and Onyenekwe, 2015). Ebonyi State is located within latitude 7^o 30'E, and 8^o 30'E, and longitude 6^o 40'N, and 6^o 45'N of South East zone of Nigeria. Ebonyi is made up of thirteen local government areas (LGAs) with a total population projected with an estimated growth rate of 3% to be 3.1 million people in 2020.



Source: Administrative map of Nigeria
MAP OF EBONYI STATE SHOWING STUDY AREAS

Fig 1: Map of Ebonyi State showing the study areas.

DATA COLLECTION AND SAMPLING TECHNIQUE

Multi-stage sampling procedures were used for this study. In the first stage, 4 Local Government Areas (LGA) out of 12 that participated in the USAID-MARKETS II project in Ebonyi State were randomly selected. In the second stage, 3 villages each were randomly selected from the 4 LGAs making a total of 12 villages. In the third stage, 239 participating rice farming households were selected from the list of USAID-MARKETS II Participants (UMP) in 12 sampled villages, using the Yemen (1967) scientific formula for calculating sample size.

Yemen (1967) scientific formula that was adopted in this study is given as $n = \frac{N}{1+N(\alpha^2)}$, 5% room for error was given and 95 percent confidence level in selecting the sample size. Where n is the sample size, N is the sample frame and α^2 is the precision level (0.05). In order to control for spill-over effect, 6 villages were randomly selected from one LGA that did not participate in USAID-MARKETS II project in Ebonyi state to serve as the control group. Also, from the list of Non-participants of USAID-MARKETS II (NPUM), using the Yemen scientific formula for calculating sample size, 252 non-participating rice farming households were selected from the 6 sampled villages. In all, a total sample size of 491 rice farming households were selected for the study. Data used in the study were collected from primary source with the aid of structured questionnaire, and field observations. Data collected were analyzed using descriptive statistics, Z statistic, Net Farm Income (NFI), and Returns Per Naira Invested (RNI) model.

Net Farm Income Model

Net Farm Income statement is a summary of revenue, and expenses for a given accounting period (usually one year). The Net Farm Income (NFI) was used in this study to measure the difference between revenue, and expenses of UMP, and NUMP in rice farming. A Positive difference indicates a profit while a negative difference indicates a loss for the farming period. The approach suggested by the Cost of Cultivation for Principal Crops as adopted by Durga, and Suresh, (2013) was used to calculate the returns on rice farming. The total cost of farming comprises of fixed, and variable costs. Fixed cost includes land payment, depreciation on farm tools,

and Implements, for owned land, rental value of the land was used. The variable cost includes cost of seeds, fertilizers, agrochemicals, labour, and interest on working capital. Interest on working capital was calculated at the rate of banks short-term loans. It was calculated for the duration of the rice crop. Net income is the difference between the gross return, and total cost of farming as stated below

Net income = GR – TC..... (1)

Where GR = gross return (value of the paddy in naira)

TC = total cost of farming

While TC = FC + VC(2)

Where: FC = fixed cost and VC = variable cost.

Returns Per Naira Invested (RNI) Model

Returns Per Naira invested (RNI) = $\frac{TR}{TC}$ (3)

Where RNI = Returns Per Naira invested

TR = Total revenue in naira

TC = Total cost of rice production in naira

If RNI is less than unity, it means it is unprofitable to embark on the investment at the present production level, and/or the present production price level. If RNI is more than unity, it means it is profitable to engage in producing the product at the present production level, and/or the present production price level. If RNI is equal to unity, it means it is neither unprofitable nor profitable to engage in producing the product at the present production level, and/or the present production price level that is its breakeven point.

RESULTS AND DISCUSSION

Profitability of Rice Production among Participants, and Non-Participants of USAID-MARKETS II.

The result of the Net Farm Income (NFI), and Return on Naira Invested used to determine the profitability of rice production among USAID-MARKETS II participants, and non-participants in Ebonyi state are presented in Table 1. The result in Table 1 reveals that the participants of USAID-MARKETS II used an average of 92 kg of rice seed per hectare, which is within the recommended rate of 50- 100kg rice seed per hectare while the non-participants of USAID-MARKETS II used 117.11kg of rice seed per hectare. The reason for these difference in rice seed usage may be as a result of the training carried out by the officials of USAID-MARKETS II on the participants. For the fertilizer

usage, the recommended rate is between 200 – 250kg/ha of NPK in the ratio of 80 -100N, 30-50P and 30-50K because of more nitrogen need of rice plant. The participants of USAID-MARKETS II project used an average of 232.41kg/ha of fertilizer, which is within the recommended rate while the non-participants used 145.32kg/ha of fertilizer. For the herbicide, the recommended rate in Nigeria is between 12 – 13litres/hectare. The sampled participants used an average of 10.3litre/ha of herbicide while the non-participants used 2.5litre/ha of herbicide. The yields obtained from rice farm by participants, and non-participants was 5.273tonnes/ha, and 3.496 tonnes/ha of paddy rice respectively; the participants are within the expected/potential yield of between 5 – 6tons/ha using improved practice while the non-participants rice yield was less than the expected/potential yield per hectare. From the result in Table 1, participants obtained higher yield from rice farm than the non-participants. The reason for this difference may be due to the adherent to the best practices by participants as was taught by the USAID-MARKETS officials/extension agents.

Also, the result presented in Table 1 shows that the total cost incurred in rice production by participants, and non-participants of USAID-MARKETS II was ₦223, 841.37, and ₦116, 114. 22 per hectare respectively. The total cost of rice production incurred by the participants was higher than that of the non-participants. This could be attributed to the fact that most of the System of Rice Intensification (SRI), and agronomy practices adopted by the participants (line planting, nursery making, transplanting among others) are cost effective. The total revenue/ha realize by the participants, and non-participants of USAID-MARKETS II in rice production was ₦716, 908.92, and ₦529, 522.34 respectively. Also, the total revenue obtain by the participants was higher than that of non-participants. The Net Farm Income (NFI) obtain by UMP, and NPUM was ₦493, 067.55/ha, and ₦353, 408. 12/ha respectively, which indicates that rice production is profitable in the study area. This findings is in agreement with the works of Ben-Chendo *et al.*, (2017) who revealed a net farm income of ₦152,600/ha in paddy rice production in Kaduna state, Girei *et al.*, (2016) who found a net farm income of ₦469, 136.00 per hectare in rice production in Fufore Local Government Area of Adamawa state, and Kadiri *et al.*, (2014) who found

a net farm income of ₦300, 071.84 per hectare in paddy rice production in Niger Delta region of Nigeria. The higher difference in NFI of participants over that of non-participants may be attributed to increase in yield realized by the participants of USAID-MARKETS II because they were taught better rice farming techniques which had impacted on their output, and revenue.

The return on investment for UMP, and NPUUM was ₦3.28k, and ₦3.05k respectively. This implies that for every one naira (₦1.00) invested by the participants, and non-participants of USAID-MARKETS II in rice production, a profit of ₦2.28k, and ₦2.05k were realized respectively, implying that rice production is profitable in the study area. It is therefore more profitable for the participants, and non-participants to invest in rice production than to invest in Nigerian banking sector through savings. This is because using the 12 % annual interest rate on savings in Nigerian banks, every ₦1 invested in the bank will generate ₦1.12 at the end of the year with a profit of ₦0.12 which is far below ₦2.28, and ₦2.05k profit realized from rice production by UMP, and NPUM in Ebonyi state. This findings agrees with Girei *et al.*, (2016) who reveals return on investment of ₦1.37 in rice production in Fufore Local Government Area of Adamawa state, Nigeria.

Difference in Net Farm Income (NFI) of Rice Production among UMP, and NPUM.

The result of Z-test on the significance difference in NFI among UMP, and NPUM farming households are presented in Table 2. The result shows that the value of Z- calculated is greater than that of Z-critical. This implies that there is a significant difference between the profit obtained in rice production by the participants, and non-participants of USAID-MARKETS II at 1% level. Therefore, the null hypothesis which stated that there is no significant difference between the profit of participants, and non-participants of USAID-MARKETS II was rejected.

CONCLUSION/RECOMMENDATION

This research work which centered on analysis of cost, and returns in rice production by USAID-MARKETS II project participants, and non-participants in Ebonyi state, Nigeria establishes that rice farming is very profitable in Ebonyi state. There was a significant difference between the profit

obtained from rice farming by participants, and non-participants of USAID-MARKETS II at 1% level. The System of Rice Intensification (SRI) practices adopted by USAID-MARKETS II project participants is very beneficial in rice production. Therefore, Nigerian government, and individuals should invest more in Ebonyi rice production

through inputs supply, and adequate training of the rice farmers on improved rice production techniques. Also, the teaming unemployed Nigerian youth should be encourage by the government, and international agencies through provision of grant/loan to take up rice farming as a business for tremendous profit.

Table 1: Profitability of Rice Production among USAID-MARKETS II Participants, and Non-participants

Var/ha	Ave qty	UMP		Ave qty N/Ha	NPUM	
		Unit price N/Ha	Ave. cost N/Ha		Unit price N/Ha	Ave. cost N/Ha
Fixed inputs						
Depreciation			3,819.59			2,222.24
Land rent			23,991.12			25,049.80
Total Fixed cost			27,810.71			27,272.04
Var inputs						
Lab(mandays)						
Fert(Kg)	141.66	856.39	121,316.21	140.19	724.15	101,518.58
Seed(Kg)	232.41	145.78	33,880.73	145.32	130.85	19,015.12
Herb(li)	92	192.03	17,666.76	117.11	162.55	19,036.23
Interest(N)	10.3	1,732.09	17,840.53	2.5	2,775.75	6,939.38
Total Variable cost	106,528.6	5%	5,326.43	46,657.4	5%	2,332.87
	196,030.66					148,842.18
Total farming cost			223,841.37			176,114.22
Farming cost - interest			218,514.94			173,781.35
Output(Kg)						
Total Rev(TR)	5,272.94	135.96	716,908.92	3,296.12	151.46	529,522.34
NFI			716,908.92			529,522.34
TR/TC			493,067.55			353,408.12
RNI	3.28			3.05		
	3.28			3.05		

Source: Field Survey, 2018.

Table 2: Z-test on Difference in profitability of UMP, and NPUM in rice production.

variables	Participants Net-farm Income(N)	Non-Participants Net-farm Income(N)
Mean	493067.9	353408.9
Known variance	6.73E+11	6.12E+9
Observation	234	242
Hypothesized Difference	Mean 0	
z-stat	4.70045***	
P(Z<=z) one tail	0.00001	
z-critical one tail	1.644854	
P(Z<=z) two tail	0.00003	
z-critical two tail	1.959964	

Source: Field Survey, 2018.

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