

**EFFECT OF USAID MAXIMIZING AGRICULTURAL REVENUE AND KEY ENTERPRISES IN TARGETED SITES (MARKETS) II PROJECT ON COCOA PRODUCTION IN ONDO STATE, NIGERIA**

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**Abstract**

Sustainable cocoa production has become an issue of worldwide interest. This study was conducted to assess the effect of MARKETS (Maximising Agricultural Revenue and Key Enterprises in Targeted Sites) II project on cocoa production in Ondo State. Multistage sampling procedure was used to select a sample of 154 cocoa farmers in the study area. Data was collected through the use of structured questionnaire and it was analysed using descriptive and inferential statistics (Cobb Douglas production function). The research findings revealed that the percentage of respondents below the age of 50 years is higher for the participants, majority had formal education but a higher percentage (90.2%) of participants had formal education. The major source of awareness of the project was through the extension agents. The result of the Cobb Douglas production function shows that the f-values of the models were highly significant, 53.089 and 38.406 before and after the MARKETS II project respectively. Also the estimated R<sup>2</sup> of 0.839 and 0.791 shows that 83.9% variation in cocoa output before the project was explained by the independent variables, while 79.1% variation was explained by the independent variables after the project. The findings also revealed that the coefficients of seedling, harvesting and pesticides had a stronger effect on cocoa output after the project. In conclusion, the

MARKETS II project played a significant role in increasing cocoa production in Ondo state. It is recommended that efforts should be intensified by the Nigerian Government to attract more youth to cocoa production, educate more farmers and implement more agricultural projects.

**Keywords:** MARKETS II project, Farmers, Cocoa production, Cobb Douglas Production Function.

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## 1. Introduction

Cocoa is of significant economic importance for both producing and consuming countries. Cocoa is a commercial crop of great importance around the world. This is evident in the worldwide production of more than 4 million tons of beans in 2019 (ICCO, 2019, Sib, Ollo, Soro & Trabi, 2020). Globally, cocoa contributes to the livelihoods of 40 to 50 million people, an estimated 5 million farming households depend on cocoa as a cash crop, and 70 per cent of cocoa is produced by smallholders living on less than USD 2 per day and relying on cocoa for 60 to 90 per cent of their income. (WCF, 2012, International Institute for Sustainable Development, 2019).

Cocoa production is also the main source of income to millions of smallholder farmers in Africa (Simo, Djocgoue, Minyaka & Omokolo, 2018). Cocoa beans are produced in tropical zones around the equator, where climate conditions are well suited for growing cocoa trees. Cocoa has become a vital export product for many countries, especially in West Africa (ICCO, 2019, Sib, Ollo, Soro & Trabi, 2020). About 70% of the world's cocoa beans are from four West African countries: Ivory Coast, Ghana, Nigeria and Cameroun (FAO, 2020). The Nigerian cocoa economy has a rich history and the contributions of cocoa to the nation's economic development are vast (Folayan, Daramola & Oguntade 2006, Nkang , Ajah, Abang & Edet, 2009). It is an important source of raw materials, as well as source of revenue to governments of cocoa producing states. Because of its importance, the Federal Government of Nigeria's concern of diversifying the export base of the nation has placed cocoa in the centre-stage as the most important export tree crop.

Agricultural projects are crucial to economic growth and accounts for one- third of the Gross Domestic Product (GDP) and three- quarters of employment in Sub- Saharan Africa (Manyong *et al.*, 2005). These agricultural projects contribute about thirty percent of the continent's GDP and about 50% of the total export value, with 70% of the continent's one billion population depending on the sector for their livelihoods (Manyong *et al.*, 2005). Agricultural projects may be technology- oriented, which are to change the technical production potential; to broaden the resource base; to improve status of disadvantaged groups; improved post harvest distribution; or institution building which may be at the Government level, project-management level and or the farmers' level (Vernon & Yujiro, 2014). Most projects tend to strengthen the capacities of rural farmers through education, training and institutional support (Yabi & Afari-Sefa, 2009). The United States Agency for International Development (USAID) Maximizing Agricultural

Revenue and Key Enterprises in Targeted Sites (MARKETS) project is an example of such projects. USAID is the world's premier international development agency and a catalytic actor driving development results. USAID leads international development and humanitarian efforts to save lives, reduce poverty, strengthen democratic governance and help people progress beyond assistance. The objective of USAID is to support partners to become self-reliant and capable of leading their own developmental programmes. It promotes American prosperity through investments that expand markets for U.S. exports; create a level playing field for United States (U.S.) businesses; and support more stable, resilient, and democratic societies. USAID and Chemonics International worked together in the Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites (MARKETS) II project through large-scale commercial buyers and agricultural lending banks to help smallholders access training and high-quality inputs, such as seeds and fertilizers. MARKETS II launched in April 2012 to promote sustainable agriculture development via increasing private sector participation and investment, raising income, increasing employment, attaining food security, and reducing poverty. MARKETS II supported the U.S. government's Feed the Future initiative, the government of Nigeria's Agricultural Transformation Agenda (ATA), and its succeeding Agriculture Promotion Policy 2016-2020 (also known as the Green Alternative). The project's systemic approach addressed limitations and opportunities in all of the value chain segments that could have an impact on the smallholder farmer's food security and income (USAID, 2017).

MARKETS II project promoted farmers' access to high yielding and improved varieties of cocoa for planting new farms and rehabilitating existing farms. The agricultural best practices that were used included pruning, phyto-sanitary management, soil fertility management, and integrated pest management. Post-harvest best practices: crack pods with wooden clubs instead of sharp

objects to avoid fungal and bacterial diseases; trays to allow fermentation uniformity; and raised drying platforms for air circulation and to avoid dampness. Companion cropping was promoted to increase farmer revenue during new plantations' early years. Also, MARKETS II conducted beekeeping and pollination training to improve cocoa yields via increased pod-bearing flowers and to provide additional income through honey sales and pollination services. Since cocoa certification attracts higher export prices for farmers, cocoa trainings were done to meet the increased productivity and higher quality certification requirements.

In Nigeria, Cocoa has been a major source of income and a major source of foreign exchange earnings. However its production has been experiencing a declining trend in recent times. (Adeniyi & Ogunsola, 2014). Nigeria has slipped from being the world's second largest producer to the fifth position, 250,000 metric tons in 2018/19 and 2019/20 (FAO, 2020). Folayan, Daramola and Oguntade (2006), Ogulade and Orisajo (2020), also noted that cocoa production in Nigeria witnessed a downward trend when its export declined to 216,000 metric tons in 1976, and 150,000 metric tons in 1986, therefore reducing the country's market share to about 6% and to fifth largest producer to date. Sustainable cocoa production has become an urgent issue and of worldwide concern (Erwin, Lina & Cahyo, 2020). The continuous fall in the output of cocoa in Nigeria in the past years has been of great concern to the Nigerian Government, as this leads to a drop in the foreign exchange earnings accruing to the Nigerian Government from its exportation (Odefadehan & Ogunwande, 2020). Different administrations have focused on agriculture as a means to diversify the economy and several policies, programmes and projects have been designed in this regard. Despite all these interventions, the agricultural sector, cocoa production inclusive, is still largely underdeveloped (Amos, 2018, Okunlola, 2019). The objective of the

study therefore, is to determine the effect of MARKETS II project on the output of cocoa in Ondo state.

## 2. Methodology

The research design is the survey type. The study area is Ondo State. Ondo State has been chosen for this study because it is the largest cocoa producing state with an output capacity of about 77,000 tons per annum (Owoeye & Sekumade, 2016). The major occupation of people in Ondo State is cultivation of cash crops like cocoa, kolanut, oil palm, plantain and banana and also food crops like cassava, maize, yam, cassava, plantain, cocoyam and vegetables.

The population for the study included all cocoa farmers in Ondo State. The multistage sampling procedure was used to select the sample. In the first stage, purposive sampling technique was used to select Local Government Areas that are known for cocoa production, which are; Akure North; Akure South; Idanre; Ifedore; Odigbo; and Owo. The second stage involved a random sampling in which 154 cocoa farmers were randomly selected from these Local Government Areas. Questionnaires were administered to the respondents to collect relevant information.

Descriptive statistic was used to compare the values of the socio economic variables. Cobb–Douglas production function was used to examine the effect of MARKETS II project on the output of Cocoa farmers in the study area. The model was used by (Bashir *et al.*, 2010; Nadia and Chughtai, 2012; Ahmad *et al.*, 2015; Abdallah, 2016; Afrin *et al.*, 2017, Abbas *et al.*, 2018). Cobb–Douglas production function can be written as follows:

$$Y = AX_1^{\beta_1} X_2^{\beta_2} X_3^{\beta_3} X_4^{\beta_4} X_5^{\beta_5} \dots\dots\dots(i)$$

Taking the natural logarithm of Equation (i) and considering the case of five explanatory variables, Equation (i) converts to the following form:

$$\log Y = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + \beta_6 \log X_6 + \mu_i \dots \dots \dots (ii)$$

Where; Y = Output of Cocoa(Naira)

$\beta$  = Constant

X<sub>1</sub> = Cost of seedling (Naira)

X<sub>2</sub> = Cost of land preparation (Naira)

X<sub>3</sub> = Cost of harvesting (Naira)

X<sub>4</sub> = Cost of pesticides (Naira)

X<sub>5</sub> = Cost of labour (Naira)

X<sub>6</sub> = Amount of credit provided (Naira)

$\mu$  = Error term

### 3. Results and Discussion

**Table 1: Socio- economic Characteristics of Respondents**

Characteristics	Participants Frequency	Percentage (%)	NonParticipants Frequency	Percentage (%)
<b>Age (Years)</b>				
20-29	3	4.2	1	1.2
30-39	15	21.1	20	24.1
40-49	26	36.6	23	27.7
50-59	22	31.0	27	32.5

60 and above	5	7.1	12	14.5
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Gender</b>				
Male	46	64.8	54	65.1
Female	25	35.2	29	34.9
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Educational Qualification</b>				
Primary school	14	19.7	23	27.7
Secondary School:	25	35.2	21	25.3
Vocational/ Technical	7	9.9	5	6.0
OND	4	5.6	8	9.6
BSc, BA, Bed, Btech, HND	14	19.7	6	7.3
Informal	7	9.9	20	24.1
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Marital status</b>				
Married	62	87.3	74	89.2
Single	4	5.6	5	6.0
Divorce/ Separated	2	2.8	4	4.8
Others	3	4.2	0	0.0
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Household size</b>				
1-3	11	15.5	18	21.7
4-6	31	43.7	46	55.4
7 – 10	29	40.8	18	21.7
10 and above	0	0.0	1	1.2
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Farming experience (years)</b>				



Below 5	1	1.4	7	8.4
6-10	9	12.7	13	15.7
11-15	15	21.1	21	25.3
16-20	20	28.2	18	21.7
21-25	11	15.5	11	13.3
25 and above	15	21.1	13	15.7
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Land size (hectares)</b>				
<1	0	0.0	5	6.1
1-5	58	81.7	69	83.1
6-10	11	15.5	9	10.8
11-15	2	2.8	0	0.0
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>
<b>Membership of cooperatives</b>				
No	46	64.8	54	65.1
Yes	25	35.2	29	34.9
<b>Total</b>	<b>71</b>	<b>100.0</b>	<b>83</b>	<b>100.0</b>

Source: Field Survey, 2020

Table 1 shows the socio-economic characteristics of the respondents. The data from the table show that the ages of participants and non- participants in the study are marked with some level of differences. The percentage of participants of the MARKETS II project that were between ages 40 and 49 years was 36.6% while the non- participants in the same age group recorded 27.7%. Also the participants and non- participants between ages 30 and 39 were 21.1% and 24.1% respectively. This shows that the percentage of respondents below the age of 50 is higher for the participants than the non- participants, which implies that the participants are younger and

a larger percentage are within their active and productive years and this also has implication for easy adoption of technology by the participants. This is in agreement with works of Oladapo *et al* (2012), and Fanola and Fakayode (2014). The table also shows that majority of the respondents were male for the participants (64.8%) and non-participants (65.1%). This may be due to the fact that cocoa production requires a lot of physical energy and are labour intensive, as also reported by Ogunsola *et al*, (2015).

Majority of the respondents had formal education, but a higher percentage (90.1%) of participants had formal education, as compared to the non- participants (75.9%). Also, 25.3% of participants had post secondary education as compared with 16.9% of non- participants. These results hint that the participants are more educated than the non- participants and has implications on better management of their farms, involvement in agricultural projects and adoption of new technology. This agrees with the findings of Iortym *et al* (2018), that some of the farmers could not participate in the project because a high percentage had no formal education.

Table 1 also shows that most of the respondents are married, 87.3% participants and 89.2% non-participants. This has implication for farm labour, the members of the family can also help on the farm.

The result for Household size as presented shows that 40.8% of the participants were within the household range of 7- 10 members while 21.7% of the non-participants had the same range of household size. Also, the participants recorded 43.7% for household size of 4- 6 while non-participants recorded 55.4%. We can deduce from this that the participants had a larger household size range of between 7 and 10 people which also has implication for family labour.

The participants and the non- participants show almost equal years of experience, except for the range between 25 years and above where the participants (21.1%) were slightly higher than the non- participants (15.7%).

Table 1 shows that the participants had larger land size than the non- participants. For the range of land size from 6 hectares to 15 hectares the participants (18.3%) showed a higher percentage the non-participants (10.8%).

Most of the respondents were not in any cooperative society, as the participants and non- participants that were not members of cooperative society recorded 64.8% and 65.1% respectively.

**Table 2: Source of Awareness of MARKETS II project**

Source of awareness	Mean	Rank
Extension agents	0.6161	1
Mass media	0.0313	5
Social media	0.0134	6
Friends and Relatives	0.0804	3
Other farmers	0.3750	2
Cooperative societies	0.0759	4
Others	0.0000	7

Source: Field Survey, 2020

Table 2 shows the awareness of MARKETS II project. The data from the table show that the knowledge of the project through the extension agents has been ranked highest, 0.6161, which implies that most of the farmers knew about the project through the extension agents. This was followed by awareness through other farmers and next was through friends and relatives. Mass media and social media on the other hand were ranked low, this was probably because most

farmers are not used to getting information from these sources. Also this may imply that the sources are not available to the farmers.

**Table 3: Result of Regression Analysis (Cobb Douglas Production Function)**

Before MARKETS II					After MARKETS II			
Code	Variables	Coefficient	<i>t</i> -value	<i>p</i> -value	Variables	Coefficient	<i>t</i> -value	<i>p</i> -value
		3.071	9.047	0.000		3.413	8.811	0.000
Log X <sub>1</sub>	Cost of seedling	0.122**	2.056	0.044	Cost of seedling	0.143**	2.046	0.045
Log X <sub>2</sub>	Cost of land preparation	0.085	1.506	0.137	Cost of land preparation	0.067	0.828	0.411
Log X <sub>3</sub>	Cost of harvesting	-0.001	-0.016	0.987	Cost of harvesting	0.209**	2.100	0.040
Log X <sub>4</sub>	Cost of pesticides	0.087*	1.816	0.074	Cost of pesticides	0.174***	3.046	0.003
Log X <sub>5</sub>	Cost of labour	0.238***	6.385	0.000	Cost of labour	0.223***	5.221	0.000
Log X <sub>6</sub>	Amount of Credit	0.240***	2.935	0.005	Amount of Credit	0.058	0.791	0.432
R Square		0.839				0.791		
Adjusted R Square		0.823				0.770		
F-Statistic		53.089				38.406		
Prob F		0.000				0.000		
		a. Dependent Variable: Output of Cocoa						
*, **, *** Significant at 10, 5, and 1 percent levels respectively								

Source: Field Survey, 2020

Table 3 shows results of the multiple regression analysis, the Cobb- Douglas production function. The estimated coefficients are elasticities of production. The intercept of the models are 3.071 and 3.413 before and after the MARKETS II project respectively, which implies the value of cocoa output when no input is used.

F- statistics of the models before and after the project shows the overall significance of the models. The F-values were highly significant, 53.089 and 38.406 before and after the MARKETS II project respectively. The estimated  $R^2$  was 0.839 before the project and 0.791 after the project. This indicates that 83.9% variation in cocoa output before the project was explained by the independent variables, while 79.1% variation was explained by the independent variables after the project. The results also revealed that the cost of seedling, pesticides and labour were significant before and after the MARKETS II project, while the cost of harvesting was significant only after the project and credit was also significant before the project. The coefficients of seedling, harvesting, pesticides and labour cost are significant and positive after the MARKETS II project, indicating that one percent increase in each variable increased cocoa output by 0.143, 0.209, 0.174, 0.223 respectively. The coefficients of seedling, pesticides and labour cost are also significant and positive before the project at 0.122, 0.087, and 0.238 respectively. Comparing the coefficients of the independent variables before and after the project, the coefficients of seedling, harvesting and pesticides were higher after the project, showing that the variables have a stronger effect on cocoa output after the project. This can be attributed to the involvement of the farmers in the MARKETS II project which promoted the farmers' access to high yielding variety of cocoa seedlings, introduction of integrated pest management systems and also harvesting and post- harvest best practices.

### **Conclusion and Recommendations**

The study concluded that most of the participants of the MARKETS II project are in their active and productive age, majority had formal education, but the participants were more educated than

the non- participants. Most of the respondents are also married and experienced in cocoa farming. Many of the farmers got to know about the project through Extension Agents from Agricultural Development Agency (ADP). Based on the findings, the study further concluded that the MARKETS II project played a significant role in increasing the production of Cocoa in Ondo State. It is therefore recommended that the Nigerian Government should intensify efforts in making cocoa production more attractive and lucrative so that more youth can be involved. Furthermore, policies and programmes should be put in place to ensure increase in the literacy level of the farmers, through education and training. Finally, more projects like the MARKETS II project that will provide necessary incentives to the farmers and in turn increase agricultural production should be designed and implemented.

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