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ANALYSIS OF FARMERS' BUSINESS SCHOOL PARTICIPATION ON COCOA PRODUCTIVITY IN ONDO STATE, NIGERIA

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ABSTRACT

Various models and approaches are being implemented to provide technical assistance and support to improve cocoa productivity in Ondo State of Nigeria. This study compared Farmers' Business School (FBS) participation and non- participation on cocoa farmer's productivity. The study specifically described the socio-economic characteristics of the farmers, examined factors determining participation in (FBS) among cocoa farmers, estimated cost and returns of the two categories and determined the technical efficiency of cocoa production for both participants and non-participants. Multi-stage sampling technique was used to obtain data from 90 cocoa farmers that were selected from three Local Government Areas in Ondo State based on their participation and non-participation in (FBS). Descriptive Analysis, Gross Margin, Logit model and stochastic frontier production function were used to analyse the data. Result from descriptive analysis revealed that the mean age of the respondent was 54.2 years. Majority of the respondent (48.9%) attained secondary education and above. It also showed that 38.9% had above 6 members to make up the household in the study area. Findings also revealed that 33.3% had an average annual income above ₦1.000,000. The result further showed that majority of the respondent produced on a medium scale with average cocoa farm size of 3.5 hectares and the farmers were well experienced. The result on gross margin analysis shows that the total revenue, gross margin and profit for participants in (FBS) were ₦678,601.3, ₦402447.2 and ₦324458.3 respectively. On the other hand, the total revenue, gross margin and profit for the non- participants of (FBS) were ₦345,217.8, ₦231,084.5 and ₦193,795.6 respectively. This figure implies that participants in (FBS) were far better than non- participants in terms of gross margin, total revenue and profit. Result of the logit regression showed that gender, age, educational level, and membership of co-

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operative society were found to be statistically significant. This implies that these variables greatly influenced the decision of the cocoa farmers in the study area to either participate in (FBS) or not. Result from the stochastic frontier production function revealed that family labour, hired labour, pesticides, area of land and amount of fertilizer were statistically significant meaning those variables determined the technical efficiency of the cocoa farmers in the study area while age, frequency of extension contact, household size and member of cooperative greatly influenced the technical inefficiency in the study area.

Keywords: Farmers business school, cocoa productivity, participation, technical efficiency

1.0 INTRODUCTION

Agricultural production is the mainstay of the Nigerian economy, considering the fact that over 80 percent of the economically active populations are involved in agricultural production directly or indirectly (Okunneye, 2010). Over 90 percent of the food consumed in the country is from the local agricultural production. In spite of the oil, agriculture remains the base of the Nigeria economy providing the main source of livelihood for most Nigerians (Okunneye, 2010). It is the second largest earner of foreign exchange; next to the petroleum sector, and also it provides a ready market for industrial product (Okunneye, 2010).

Prior to the oil boom era in Nigeria, cocoa, cotton, groundnut, palm oil products and rubber were the principal export crops. The main agricultural subsector which contributes immensely to Nigeria's GDP is cocoa. Cocoa contributes about 15% to the total Nigerian export in 1970 (Adebile and Amusan, 2011). For instance, Nigeria earned ₦142 billion from cocoa export in 2012 (Aganga, 2013). Originally, cocoa was mainly cultivated in the tropical rainforest in South America. Once established in Ghana, cocoa production expanded rapidly in Africa and by mid 1920s, West and Central Africa (WCA) became the main producer. Cocoa grows naturally in tropical rain forests. This habit provides heavy shade and rainfall, uniform temperature and constant relative humidity. Over the year, cocoa production flourishes in Western Nigeria especially in the area that was more than 20 degrees north or south of the equator. There are three main varieties of cocoa: forastero, criollo, trinitario (ICCO 2007). Cocoa plays a significant socio-economic role in Nigeria (Agbongiarhuoyi *et al*, 2013), as it accounts for about 2% of the national export earrings and over 200,000 rural households in cocoa producing states depend on cocoa for the majority of their cash income (NCDC 2018). Cocoa production is important to the economy of Nigeria, cocoa is the leading agricultural export of the country and Nigeria is currently the world's fourth largest producer of cocoa. Nigeria earned over N103 billon from cocoa commodity export in the year 2018 (Segun, 2018). Cocoa has made significant contribution in terms of total production, foreign exchange, earning capacity and income generation to Nigeria economy. Over 620,000 ha of land is under cocoa cultivation, with national

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production put at a little above 245,000 MT of cocoa beans in 2010/2011 cocoa season (Faturoti, 2010) but currently, land area under cocoa cultivation in Nigeria is estimated at 650,000ha with production of 250,000 metric tonnes perannum.

Different models and approaches are being carried out in order to provide technical assistance and support to improve small holder farmers' income and welfare in Ondo State, Nigeria. Input subsidies and transfers both cash and in-kind, as well as extension services and information provision, are commonly used approaches to target these farmers. Impacts of inputs subsidies have been widely studied but impact evaluations of extension services are more elusive due to the inherent difficulty of attrition, information spill overs and measuring knowledge overtime. (Birkhaeuser, Evenson and Feder 1991; Birner *et al. 2006*; Ragasa and Mazunda 2018; Faure *et. al* 2017).

Farmer Business School (FBS) is a new methodology being implemented. The Farmer Business School (FBS) is a derivative of Famer Field School (FFS) as an effective approach to technical education and capacity building. Farmers generate knowledge that is functional and necessary to improve their production and livelihood potential. It empowers the farmers because apart from generating knowledge as well as the owners (FARM Bulletin 2003), FFS is a group learning approach for farmers to learn about specific topics:

The topics emphasized on conservation, agriculture, soil husbandry, animal husbandry, organic agriculture, to income generating activities such as handicrafts. It teaches basic agricultural and management skills that makes farmers experts in their own farms. FFS is a forum where farmers and trainers debate observation, experience and present new information (Gitau, 2010). The ability of both FFS and FBS spread the knowledge learned in a rapid way. Instead of a top-down approach, FBS and FFS use a participatory approach that engages the farmer participants in ways that lecture formant is often unable to do (Feder *et al.*2013).This study will examine the (FBS) concepts, a year-long group-based learning approach aimed at equipping small holder farmers to make better agricultural production decision that can enhance productivity and farm incomes.

2. METHODOLOGY

2.1 Study area

The study area is Ondo State Nigeria; it was created on 3rd of February 1976 from the former Western State of Nigeria. Ondo State has an estimated land area of 15,500 square kilometres. The State is made up of eighteen Local Government Areas and lies between latitudes 5º45′ and 7º52′ N and longitudes 4º20′ and 6º05′ E. The estimated population for 2019 is 4,671,695 (NBS, 2016). Ondo State lies within the equatorial hot wet climate belt except for the northern part of the State where the derived savannah climate is experienced. The rainfall varies from 2600 mm

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in the coastal area of the State to nearly 1200mmin the northern extreme (Ebewore, 2013). During the raining season, the mean monthly temperature range is 18º to 30ºC and 30º to 35ºC during the dry season (Ebewore, 2103). The climate experienced in the State is favourable to agriculture which is the dominant occupation of the people of Ondo State; the high rainfall is favourable for the cultivation of tree crops like cocoa, oil palm, kola nut, and rubber. Ondo State produces the highest volume of cocoa in Nigeria and it is estimated at 77,000 tons per annum.

Map of Ondo State, Nigeria showing all its Local Government Areas

Source: Ministry of Economic Planning and Budget, Ondo State Website.

2.2 Sampling procedure

The population of the study comprises all cocoa farmers that have been involved in Farmers' Business School and registered cocoa farmers who have not attended Farmers' Business School in Ondo State of Nigeria. A multi-stage sampling procedure was used in selecting respondents for the study. Out of the three agro-ecological zones in Ondo State (Ondo North, Ondo Central and Ondo South), one Local Government Area (LGA) was purposely selected from each of the zones based on where cocoa farmers were involved in FBS coupled with the fact that these farmers have not been exposed to FBS training. The following (LGAs) were selected: Idanre,

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Ose and Ile olujiin Ondo State. The number of registered FBS farmers and non-FBS farmers was obtained from Desk Officer on Farmer Business School. A systematic random sampling technique was used to select 45 participants from the list of registered FBS participants in the three (LGAs) (using proportionate sampling), while proportionate random sampling technique was used to select 45 non-participants for the control group, making a total of ninety sample size for the study (45 FBS participants and 45 non-participants.

2.3 Data collection

The primary data set used in this study was collected by administering a pre-tested questionnaire on sampled cocoa farmers. Information was sought on; socio-economic characteristics of the respondents, cost and returns on cocoa production, factors determining participation in (FBS) and technical efficiency of cocoa production in the study area.

2.4 Data Analysis

2.4.1 Descriptive statistics

This includes frequency counts, means and percentages which were used to describe the distribution of socio-economic characteristics of respondents and to measure other variables of interest in the study.

2.4.2 Logit Model

Following Amemiya (1981), the general form of the univariate dichotomous choice model can be expressed as:

$$P_i = P_i (Y_i = 1) = G (X_i \Phi) (I = 1,2 ..., n)$$

The Equation 1 states that the probability of an outcome, $P_i (Y_i = 1)$ is a function of the vector of explanatory variables X_i and unknown parameter vector Φ. Because the functional form of G is unknown, practical applications of the model are not feasible (Amemiya, 1981). Then, an explicit functional specification of G is necessary. Three functional relationships often specified are the linear probability, probit and logit models. The dichotomous dependent variable model that was used in the study is logit (the standard normal distribution function).

The model is specified in the general form thus:

$$\text{Log } P/1\text{-}P = \text{Log } O_i = a_i + \beta_i X_i + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n$$

Where

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Log P/1-p = Log of odds of participating in the intervention programme

a = constant

β= coefficients and

X_n = socio-economic characteristics of the respondents.

The dependent variable is the participation and non-participation of FBS among cocoa farmers. This model addresses factors determining participation in farmers business school

Measurement of independent variables:

X_1 = Age (years)

X_2 = Gender (male =1 and female =0)

X_3 = Marital status: (Married= 1, others = 0)

X_4 = Educational level (years)

X_5 = Farming experience(years)

X_6 = Farm size (hectares)

X_7 = Household size (Number)

X_8 =Land ownership (owned it personally, by inheritance, by rent and by government)

X_9 = Cooperative membership (yes =1 or no =0)

2.4.3 Gross Margin

Gross Margin Analysis (GMA): An enterprise gross margin can be estimated as enterprise output less variable cost. This analysis reveals the income accruable to the farmers in the study area. The variable cost incurred by the farmers include cost incurred on land preparation, planting materials, fertilizer, agrochemicals, harvesting, labour cost and transportation cost. These variable costs vary from one farmer to another because some farmers use hired labour while some engaged both hired and family labour.

GM= TR – TVC

TR= Total Revenue

TC= Total Variable Cost

Decision rule for apriori expectation

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If GM > 0, (then, it is profitable)

If GM < 0, (then, it is not profitable)

If GM = 0, (then, it breaks even)

Profitability Analysis:

$\Pi = TR - TC$

Π = Profit

TR = Total revenue

TC = Total cost

Decision rule for apriori expectation

If $\Pi > 0$, then it is profitable

If $\Pi < 0$, then it is not profitable

If $\Pi = 0$, then it breaks even

2.4.4 Stochastic Frontier Production Function

Scholars such as (Amaza P. S, Maurice D. C., 2005) applied stochastic frontier model to estimate technical efficiency. The empirical model estimated takes the following general form:

$$Y = f(x_i, \beta)e^{vi-ui}$$

Where Y is the dependent variable, f(x) is the functional form, β is the technical coefficient, vi is the random component which assumed to be identically and independently distributed with mean zero, and ui is the inefficiency effect of the firm. The estimated Cobb-Douglas stochastic frontier Production function is assumed to specify the technology of the farmers and is specified in the form:

The stochastic frontier model for cocoa production is defined explicitly as:

$$LnQ_1 = \beta_0 + \beta_1 lnx_1 + \beta_2 lnx_2 + \beta_3 lnx_3 + \beta_4 lnx_4 + \beta_5 lnx_5 + \beta_6 lnx_6 + V_i - U_i$$

Where

Q is the total output in tonnes.

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X_1= labour cost

X_2= depreciated value of farm implement.

X_3= pesticides used in Naira

X_4= insecticides used in Naira

X_5= amount of fertilizer used in Kg.

X_6 = area of land cultivated (hectare)

The β's are unknown parameters to be estimated.

The V_i are assumed to be independent and identically distributed random error having $(o,\sigma v^2)$ and the U_i are non-negative random variable called technical efficiency in effect, which are assume to be independently distributed such that U_i is defined by truncation (at zero) of normal distribution with mean, u_i, variance σ^2 where u_i is defined by

$$u_i = \delta 0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 + \delta_7 Z_7$$

Where

Z_1= Age (years)

Z_2= Level of education (years)

Z_3= Farming experience (years)

Z_4= Age of plant (years)

Z_5 = Frequency of extension visit (1=monthly, 2= every two months, 3= every six months, 4= once in year, 5= no visit at all)

Z_6= Household size (number)

Z_7= Cooperative membership (1=yes, 0=no)

3. RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of the respondents in the study area

The result in Table 1 describes the socio-economic characteristics of the cocoa farmers in Ondo State, Nigeria. From the result, it is revealed that majority (75.6%) of the respondents were male

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while few (24.4%) were female. The dominance might be attributed to the fact cocoa management practices (such as spraying, trimming and harvesting) are gender sensitive which could only be performed effectively by men. This result supports the findings of Ajayi *et al.* (2019) who found that majority of the cocoa production sector in Ondo State was dominated by male. The age distribution of the respondent in the study area shows that 47.8% of the cocoa farmers fell within the age bracket of 51 to 60 years, 27.8% were within41-50 years. About 19% were above 60 years, while the remaining 3.4 and 2.2% of the respondents fell within the age of 31-40 years and below 30 years respectively. The result further reveals that the mean age of the respondent was 54.2 years. This implies that cocoa production in the study area is dominated by ageing population. This might be due to the rural-urban drift by the youth which resulted to leaving behind the aged populations in the rural areas of Nigeria.

This result is in consonance with the finding of Owoeye and Sekumade (2016) who found out that majority of cocoa famers in Ondo State Nigeria were in their relative old age of above 50 years.

The result of the marital status of respondent in the study area reveals that majority (90.0) % of the respondents were married and about 8% were widowed while the remaining few 2.2% of the respondents were single. This implies that most of the cocoa farmers were married. This is in agreement with the findings of Sowunmi *et al.* (2019) who found out that majority (88.4%) of cocoa farmers in Ondo State of Nigeria were married. Hence, there could be a probability of spouse influence on their on-farm and off-farm decision making, such as their participation in the Farmers Business School (FBS). The educational level of the respondents in the study area shows that 48.9% of the respondents had attained secondary education as their highest level of education, 45.6% of the respondent attained primary education as the peak of their educational pursuit, while 3.3% of the respondents had tertiary education. However, very few (2.2%) of the respondents claimed that they had not had access to any form of formal education. This shows that most of the respondents had accessed one or more forms of formal education prior to the time when the interview was conducted. This implies that cocoa farmers in the study area were fairly educated, which could play a great role in influencing their decision on whether or not to participate in FBS.

The household size of the respondents, in terms of members living in the house and eating from the same pot. The result shows that 38.9% had above 6 members in their household, 36.7% of the respondents had between 5-6 members in their household, 22.2%, had between 3-4 household size while only few (2.2%) of the respondent had household size less than 2 members. The average household size in the study area is 6 members. This implies that the cocoa farmers in the study area had relatively large number of household members. This would enhance the

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manpower and human resources needed on their cocoa farms. This is in tandem with the report of Adegbite *et al.* (2007) cited in Omoare and Oyediran (2015) who reported that large households' size is an important factor in any rural communities because it provides the manpower for farm and other household activities. The estimated income of respondents in the study area shows that 33.3% had an average annual income above ₦1, 000,000, 18.9% had an annual income of ₦251, 000-500,000, 28.9% had between ₦501,000 and ₦ 750,000, 14.4% had between ₦751,000 and ₦1,000,000 while 4.5% had less than or equal to ₦250,000. The result further reveals that the mean value for their annual income was ₦814,222.22 From the result, it is revealed that 57.8% of the respondents acquired their plantation through inheritance, 30% of the respondents purchased their cocoa plantation while 10.0% cultivated and leased their plantation and 2.2% from government. The implication of this is that direct purchase and inheritance are the major methods of cocoa plantation acquisition in the study area.

The table further revealed that 25.6% of the farmers had less than or equal to 2 hectares of land as their farm size, 30% had a farm size of 2.10-3hectares while 22.2% had 3.10-4hectares and 22.2% had more than 4 hectares of farm size. This is in agreement to the findings of Adeogun (2008) that majority of farmers in cocoa producing states in Nigeria had between 1- 5 acres of cocoa farm. This means that cocoa farming is practiced on a medium scale in the study areas. The source of information to the farmers in the study area was majorly from radio/television 60%, ADP 25.6% and friends/relative 14.4%. Abiona, (2010) explained that farmers' sources of information had influence in the decision to accept or reject a technology. Source of input supply to the cocoa farmers in the study area shows that a fairly large percentage of the respondents (50%) got their farm inputs from shop keepers, about 38.9% purchased theirs from ADP, and 8.9% from cooperatives while 2.2% from friends.

The result further revealed that 55.6% of the respondents had frequency contact with extension officers every one month, 12.2% every two months, 5.6% once in a year, 16.7% no contact at all and 10.0% once in two weeks. This implies that there is frequency of extension contact in every month in the study area. The result also showed that 22.2% of the respondents had been in cocoa farming for more than 30 years, 18.9% had 26-30years of farming experience, 14.4% had 21-25years, 16.7% had 16-20years, 118.9% had 11-15years and 8.9% had 6-10years. This implies that the respondents have been in cocoa farming for quite a long time and they were full of experience.

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Table 1: Socio-economic characteristics of respondents

Variables	Frequency	Percentage
Age (years)		
≤30	2	2.2
31-40	3	3.3
41-50	25	27.8
51-60	43	47.8
>61	17	18.9
Gender		
Male	68	75.6
Female	22	24.4
Marital status		
Single	2	2.2
Married	81	90
Others	7	7.8
Educational level		
Primary	41	45.6
Secondary	44	48.9
Tertiary	3	3.3
Others	2	2.2
Household size		
≤2	2	2.2
3-4	20	22.2
5-6	33	36.7
>6	35	38.9
Annual income		
≤250,000	4	4.5
251,000-500,000	17	18.9
501,000-750,000	26	28.9
751,000-1,000,000	13	14.4
Above 1,000,000	30	33.3
Land ownership		
Inheritance	52	57.8
Rent	9	10.0
Personal	27	30.0
Government	2	2.2
Farming size (Hectare)		

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≤2	23	25.6
2.10-3.0	27	30.0
3.10-4.0	20	22.2
>5	20	22.2
Source of finance		
Personal	67	74.4
Friends/Relatives	11	12.2
Cooperative society	9	10.0
Banks	3	3.3
Source of information		
Radio/Television	54	60.0
Friends/Relatives	13	14.4
ADP	23	25.6
Source of Input supply		
ADP	35	38.9
Cooperative	8	8.9
Friends	2	2.2
Shop keepers	45	50.0
Frequency of extension contact		
Every month	50	55.6
Every two month	11	12.2
Once in a year	5	5.6
No contact at all	15	16.7
Fortnight	9	10.0
Farming experience		
6-10	8	8.9
11-15	17	18.9
16-20	15	16.7
21-25	13	14.4
26-32	17	18.9
>32	20	22.2
Source of Labour		
Family and hired	21	23.3
Hired	69	76.7
Access to Credit		
Yes	44	48.9
No	46	51.1

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Cooperative member		
Yes	44	48.9
No	46	51.1

3.2 PARTICIPANTS AND NON-PARTICIPANTS COST AND RETURNS

The result in Table 2 shows the costs and returns of the two categories i.e. participants and non-participants of farmers' business school of cocoa farmers in the study area. The variable cost constituted the larger percentage of the total production cost. The total revenue, gross margin and profit for the participants were ₦678,601.3, ₦402447.2 and ₦324458.3 respectively. On the other hand, the total revenue, gross margin and profit for non- participants of farmer business school were ₦345,217.8, ₦231,084.5 and ₦193795.6 respectively. This figure implies that participants in farmer business school were far better than non- participants in terms of gross margin, total revenue and their profit.

Table 2: PARTICIPANTS AND NON-PARTICIPANTS COST AND RETURNS

Item	**Participants' costs and returns**			**Non-participants' cost and returns**		
Variable cost	**Mean**	**Std. Dev**	**Max**	**Mean**	**Std.dev**	**Max**
Cost of labour	211763	358934.4	2,000,000	66466.7	81425.8	440,000
Volume of agro chemicals	33130	37027.8	150,000	16533.3	15223.8	65,000
Volume of pesticides	9610	11150.5	40,000	11371.1	21023.8	138,000
Volume of insecticides	14095.6	14852.8	52,000	11733.3	12909.9	75000
Volume of fertilizer	3600	8050	35,000	5417.8	7352.8	18,000
Cost of seed	3855.6	6477.8	28,000	2611.1	4168.2	16,000
Total variable cost	276054.1			114133.3		
Fixed cost						
Cost of land	74622.2	228665.7	1,500,000	36544.4	149504.9	1,000000
Depreciation value of farm implement	3466.7	6858.5	28,000	744.4	1304.1	4,000
Total fixed cost	78088.9			37288.9		
Total income	678601.3	1199605	7579000	345217.8	296278.	800,000

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1

Total cost	354143	151422.2
Profit	324458.3	193795.6
Total revenue	678601.3	345217.8
GM=TR-TVC	402447.2	231084.5

Source: field survey 2021

3.3 FACTORS DERTERMINING PARTICIPATION IN (FBS)

Various socio-economic factors (taken as explanatory variables) were analysed against the dependent variable (participation in FBS) through the Logit model. Table 3shows the result of the Logit regression model which empirically explained the effects of explanatory variables (independent variables) on cocoa farmers' decision to participate in the Farmer Business School. The result indicated that Logit model was tested against 13 independent variables. Overall variation by all variables showed that this model could only explain 33% variations towards cocoa farmers' decision to participate in the Farmer Business School. The output of the Logit regression model also shows that the likelihood ratio chi-square is 41.59 with a P-value of 0.0001, implying that the model, as a whole, fit significantly better thana model with no predictors (empty model).

The explanatory variables (socio-economic characteristics) that were found significant ($P \leq 0.05$ or $p>/z/\leq 5$) in explaining cocoa farmers participation in FBS were; gender, age, educational level and membership of cooperative societies. Gender of the Cocoa farmers was positively (Coef = 3.310; $P \leq 0.05$) related to the decision of the farmers to participate or not in the programme. The regression coefficient shows that for a unit increase in the number of male cocoa farmer in the study area would bring about increase in level of participation in the FBS programme, holding that all other independent variables remain constant. This could be because of the cultural restrictions of the females that disallow them to freely make decision on their own activities. This supports the assertion of FAO (2020) that socio-cultural norms and gender roles often restrict rural women's ability to participate in decision making and various rural programmes.

The age of the respondents was a continuous explanatory variable measured in actual age of farmers in number of years. The regression analysis shows that there was a significant negative (coef = -0.115, $P \leq 0.05$) relationship between the age of the cocoa farmers and their participation in the FBS programme. The result shows that a unit increase in the age of the farmer would result in an expected 0.115 decrease in the probability of their participation in the FBS programme. This implies that the older the farmers, the lesser the likelihood of the farmer being

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a participant of the FBS programme. This could be because the older farmers might not be willing to undergo the stress and rigours of an informal (adult) education such as the (FBS). This result was in line with the findings of Mutura *et al.* (2015) and Ishaq *et al.* (2017), who found out that younger farmers tend to adopt new technologies or find means to acquire knowledge to improve their skills as opposed to the older farmers who gives in to the ancient methods and knowledge they possess.

Educational level of the cocoa farmers was negatively (coef= -0.154; P≤0.05) related to the decision of the farmers to participate or not in the programme. The regression co-efficient shows that for a unit increase in educational level, there is an expected 0.5149177 decrease in the probability of the farmers participating in the FBS programme. This implies that the more educated the farmers, the lesser the likelihood of participating in the FBS, this could be because the more educated farmers might see no reason for them to enrol in such a school when they could acquire the supposed knowledge through various means such as internet, conferences and seminar. That is, they might not give preference to adult education such as FBS.

Members of cooperative were relatively measured by participant. The regression analysis shows that there was a significantly negative (coeff =-1.412, P≤0.05) relationship between the membership of cooperative of cocoa farmers and their participation in the FBS programme. The result shows that a unit increase in the membership of cooperative of the farmer result in an expected 1.412 decrease in the probability of their participation in the FBS programme. This implies that the more the members of cooperative participate in cooperative meetings and programmes, the lesser the likelihood of participation in FBS. This could be because they are able to acquire knowledge and resources like agrochemicals, capital, seed, that will give an increase to their productivity in cocoa production. Therefore, the cooperative members see no reason for them to participate in FBS since they are able to get what they needed in their various cooperative societies.

Table 3: Factors determining cocoa farmers' participation in (FBS)

Explanatory variables	Coef.	Std.Err	p-value
Gender	3.310025***	1.002075	0.001
Age	-114862**	.0559123	0.040
Marital status	-.3799292	1.269861	0.765
Education level	-1.549177**	.6752475	0.022
Occupation	-.0643709	.2326475	0.782
Land ownership	-.188479	.3228519	0.559
Households	-.0109162	.2035119	0.957
Farm size	-.0045017	.1773555	0.980

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Source of input	.1252068	.3797897	0.742
Source of information	-.2507562	.3706701	0.499
Frequency of extension contact	-.1524401	.1743277	0.382
Farmer experience	.075548	.0460424	0.101
Member of cooperative	-1.412333**	.6455446	0.029
Constant	8.29277**	4.174324	0.047

Log likelihood = -41.593424; LR chi^2 (13) =41.58; Prob > chi^2 = 0.0001; Pseudo R^2 = 0.3333.

Source: computed from field survey, 2021

3.4 Technical efficiency of cocoa production among participants and non-participants of (FBS)

The result of frontier model for participants and non-participants of farmer business school in cocoa production from Table 4 family labour, hired labour, pesticides, area of land cultivated and amount of fertilizer contributed significantly to the output of cocoa production in the study area. Therefore, these five variables are statistically significant, while insecticides did not significantly influence technical efficiency therefore family labour, hired labour, pesticides, area of land cultivated and amount of fertilizer are efficiently used by the cocoa farmers in the study area. Insecticides in the other hand are not efficiently used by the farmer in the study area.

The analysis of the technical inefficiency effect model shows that age, frequency of extension, household size and cooperative membership were statistically significant, implying that these variables greatly influence technical inefficiency of the cocoa farmers in the study area. While the negatively related variables promote technical inefficiency, the positively related ones reduced technical inefficiency among the cocoa farmers. A wide variation in technical efficiency among the cocoa farmers was observed with the maximum and minimum values of 0.9810 and 0.4392 respectively and a mean technical efficiency value of 0.9138

Table 4: Estimate of stochastic frontier production function of cocoa production

Variables	Coefficient	Standard error	t-ratio
Efficiency factor			
Constant	5.4910***	0.7073	7.7631
Family labour	0.1566***	0.0344	4.5475
Hired labour	0.2220***	0.0708	3.1375
Pesticides	0.2340***	0.0378	6.1871
Insecticides	0.0678	0.0406	1.6648

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Area of land	3.5628***	1.0004	3.5611
Amount of fertilizer	3.2944***	0.0663	4.9618
Inefficiency factor			
Constant	-2.2652**	1.1004	-2.0584
Age	-0.0115***	0.0132	-8.6996
Education	-8.9835	2.4736	3.6316
Farming experience	-0.0664	0.06591	1.0083
Freq of extension	0.0645**	0.0275	2.3419
House hold size	2.1473*	1.0480	2.0489
Cooperative member	0.0374***	0.0119	3.1424
Technical efficiency			
Mean TE	0.9138		
Minimum TE	0.4392		
Maximum TE	0.9810		
Variance parameters			
Sigma squared	0.0919	0.0178	5.1575
Gamma	0.0500	2.5013	2.0042
Loglikelihood function	-0.1863		

Source: field survey 2021

CONCLUSION

From the finding in, it was concluded that participants in farmer business school approach were far better off than non-participant in terms of their productivity, the figure of cost and returns obtained in terms of total revenue, gross margin, total cost and profit. It can be inferred from the study that age, educational level, household size, annual income, farm size, and farming experience greatly influenced participation of farmers in (FBS) in the study area. It was further concluded that the cocoa farmer in the study area were technical efficient, but there is always room for improvement through proper allocation of the productive resources

Age of cocoa farmers, education, and frequency of extension contact, their household size and cooperative members are inefficiently significant and are important policy variables and determinant of efficiency which policy makers in Ondo State should bear in mind in making agricultural policies aimed at improving the productivity and efficiency of cocoa farmers.

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Recommendation

Arising from the study, the following recommendations were made

- There should be development of initiatives and intervention programmes to integrate youth into cocoa farming as a means of suitable livelihood.
- Non-participants should been lightened to participate in FBS to increase their level of productivity and profitability as revealed in the cost and returns analysis.
- Government should assist the farmers with soft loans so as to help the farmers to increase their scale of production.
- There is need for more awareness emphasizing on the importance of FBS in the state which was reported inadequate due to reduction in frequency of extension contact.

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