Research Article

Profitability and Utilization of Farmer Business School Extension Approach on Smallholder Cocoa Farmers in Nigeria

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Abstract | This study is designed to investigate the profitability and utilization of Farmer Business School (FBS) extension approach on cocoa smallholder farmers in Ondo and Osun States of Nigeria. Multistage sampling procedure was used to select (160) respondents. The primary data were collected through structured questionnaire. For the data analysis, statistical tools such as budgeting technique and logitistic regression were used. Results of the budgeting technique showed that each farmer of the FBS approach had a mean profit of ₦ 81,134.65 with a cost benefit ratio of 1.09. The results of logistic regression revealed that the age of cocoa farmer, level of education, extension contact, farm size and cocoa annual income are major determinants influencing the utilization of FBS approach. The study concluded that the utilization of FBS approach by smallholder cocoa farmers contributes substantially to the profitability of cocoa business. It is, therefore, recommended that effective general extension services should be extended to the study area to intensify the use of FBS introduced innovative skills by farmers for cocoa production.

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Introduction

Cocoa, *Theobroma cacao*, is indigenous to South and Central America's intense tropical areas (Tenkap and Balogun, 2020; Afolayan, 2020). In reference to total global production, Africa is expected to remain the largest cocoa producing continent, accounting for 77% of world cocoa output. The shares of the Americas and Asia and Oceania are likely to be 17% and 6% respectively (ICCO, 2021). Thus, as compared to African countries that accounted for the two-third of world cocoa production, South and Central American countries produce just around 14% of world's current cocoa production (FAOSTAT, 2018). The world cocoa production is estimated to be about 5.024 million tonnes in the year 2020/21 season (ICCO, 2021).

Cocoa is one of Nigeria's most crucial agricultural exports (Afolayan, 2020), Nigeria is ranked as Africa's fourth cocoa producer, trailing Cameroon which is the third, Ghana as the second, and Côte d'Ivoire as the largest (Shahbandeh, 2021).

In Nigeria, Cacao is an economic tree grown almost entirely on small holdings which constitute less than one hectare (Poelmans and Swinnen, 2016; Kozicka *et al*., 2018). Most of the cocoa plantations were established more than forty years ago and very old producers and tenants are farmers involved in cocoa production (Wessel and Quist-Wessel, 2015). The main issues that cocoa industries confront are inconsistency in production, poor access to finance and marketing information, low yield arising from ageing trees, infestation of pests and pathogens, high cost of acquiring equipment, increase in production sustainability when considering modified varieties, cost of crop management, organizing chain cost of quality control in meeting the demands of many customers (Hütz-Adams *et al*., 2016; Kamphuis, 2017; Beckett, 2018).

Cocoa beans are what usually exported and its processing activities are not fully met inside the country, mostly undertaken by resource-poor and low technical farmers (Hütz-Adams *et al*., 2016). These farmers usually facing difficulties in establishing new cocoa farms and rehabilitating existing ones. All of these factors have made it difficult for the cocoa sub-sector to get enough attention in order to maintain its top role as a non-oil export. Despite several interventions and programs organized by the Nigerian government to tackle the issues confronting cocoa farmers, yet cocoa bean production was continued to fall (Taiwo, 2016; Afolayan, 2020).

However, extension services were provided and presented in various ways, with the ultimate objective of maximizing farmer production and income. The effectiveness of extension in accomplishing this will, however, be determined by the extension approach used to reach or communicate with farmers. Many extension strategies have been implemented over the years, according to Bahgat (2019) who identified eight extension approaches as a commodity specialized approach, a training and visit approach, a general approach, a participatory approach, a farming system approach, a project approach, a cost-sharing approach and an educational institution approach are all possible approaches. Also, other various scholars defined a diversity of other approaches (Kaur and Kaur, 2018).

Often, farmers are vulnerable to manipulation by middlemen due to weak supply routes that make it difficult to get market information. Local farmers are practically unable to enter their public markets resulting from market space monopoly. The route to collaborative marketing of products is long attributable to a shortage of organizational skills and established farmer organizations and cooperatives, and concerning these, Farmer Business School (FBS) initiatives would work on enhancing robust managerial and organizational skills as well as technical abilities. As a result, FBS was designed with the goal of assisting farmers in enhancing their skills and knowledge in order to make their operations more profitable, to as well learn about business (Kahan and Steven, 2009). According to Adetarami *et al*. (2020), development, commercialization, liberalization, social change and industrialization are all causing significant changes in farming around the world. In response to these changes, the United Nations' Food and Agriculture Organization has created a variety of specialist training materials on market-oriented agricultural business management.

According to Adetarami *et al*. (2020), Farmer Business School (FBS) is a Cocoa Livelihood Programme (CLP) coordinated by German International Corporation called (GIZ) in 2010. It is specifically designed to train farmers on business skills. GIZ is one of the development partners that is interested in developing the business skills of small holder Cocoa farmers in Nigeria and three other West African countries namely; Ghana, Cameroon and Cote d'Ivoire. The other development partners operating in Nigeria in partnership with GIZ are; International Institute of Tropical Agriculture/ Sustainable Tree Crop Productions (IITA/STCP), Societe de Cooperative pour Le Development International (SOCODEVI) and Thecnoserve.

Considering this paper, we are focusing on FBS designed by GIZ. Farmer Business School (FBS) extension approach is a Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ-led entrepreneurship and business development initiative for smallholder cocoa farmers, with backing from the Bill and Melinda Gates Foundation and the World Cocoa Foundation. This extension system equips farmers with a

mindset of perceiving themselves as entrepreneurs and investors after participating in FBS training. Originally, FBS was designed on the Sustainable Cocoa Business Programme (SCB) for cocoa smallholders in Central and West Africa, but recently, twenty (20) GIZ initiatives are already utilizing FBS activities for over 21 diverse leading technologies with 40 different distinct syllabi. Approximately 900,000 beneficiaries across 16 Sub-African nations have benefitted from FBS educational programs. Many GIZ projects and partnerships are now using this FBS extension approach to solve their needs (Matthess *et al*., 2017).

Farmer Business School presents a very rich content which emphasizes on the fact that farming is a business, to understand your assets you must first understand the units, how to run your farm such that you have adequate food, money in, money out: find out if you're operating a profitable business, choices for a profitable business, take advantage of opportunities to expand your farm operations and earn more money, manage your return on investment all through the year, where to obtain high-quality financial services, manage risks and uncertainty, added value from quality cocoa, earning more money by investing in replanting of cocoa and becoming an entrepreneur in practice (GIZ and Cocoa Livelihood Program, 2016).

Therefore, the use of school innovative extension approach and strategy like farmer business school to increase business skill should be the concern of all involved in agricultural extension and advisory services. FBS was conceived and introduced to help cocoa farmers in building business knowledge and skills to make their farms more profitable. Many farmers in Nigerian agriculture are ignorant of how to maximize their revenue by utilizing market chances of making better decisions which in turn will enable them to compete favourably in a new environment. This study would reveal the level of adequacy FBS extension approach in shaping the entrepreneurial skills of the participants. Also, the study would provide empirical findings for policy makers in the realm of entrepreneurship and extension strategy for policy formulation in the study area.

Objectives of the study

Against this background, the present study is therefore motivated to determine the profitability and utilization of Farmer Business School extension approach by smallholder cocoa farmers in Ondo and Osun States, Nigeria. The study also specifically evaluates the profitability of cocoa farmers after participating in FBS approach and analyzes the effect of profit on the utilization of innovative skills disseminated by FBS extension approach.

Hypothesis of the study

The study's hypothesis was stated in null form (Ho_1): There is no significant relationship between the utilization FBS approach and selected factors.

Materials and Methods

The study area

The research was conducted in Ondo and Osun States of Nigeria, between July and December, 2019. This was considered on the impacts of FBS' after implementation from its first phase (2011-2013) to second phase (2014-2018).

Ondo State is among Nigeria's 36 states and was carved out of the old Western region on the 3rd of February, 1976. The state comprises 18 Local Government Areas (LGAs) with a projected population of 4.6 million inhabitants (NBS, 2017). The favourable geographical location and climatic condition make the state a veritable agricultural zone for the cultivation of cocoa (Sowunmi *et al*., 2019; Tenkap and Balogun, 2020). Foods as well as other cash crops are cultivated by farmers all through the state for both personal consumption and commercial sales. Other crops grown include kolanut, palm produce, citrus, cashew, timber, rubber cowpea, plantain, cassava, soya beans and yam (Oke *et al*., 2020). The region of Ondo State generates the most cocoa in Nigeria (Sowunmi *et al*., 2019).

Osun State is in Nigeria's south west, encompassing latitudes 7^0 and 9^0 north of the Equator and longitudes 2.75^0 and 6.75^0 east of the Greenwich Meridian. The State of Osun is organized into 30 Local Government Councils. Traders, artisans, and farmers make up a large portion of the population of the state (Adepoju, 2015). Among the cash crops produce in the state are tobacco, cocoa and palm produce (Oke *et al*., 2020). Cocoa is the state's principal cash crop, coming in second only to Ondo State in terms of cocoa production (Popoola *et al*., 2015) (Figure 1 and 2).

Sampling techniques and sample size

The target population of this study was cocoa farm-

ers that have participated in FBS training and still utilizing the programme' activities. The respondents for this study were chosen using multistage sampling methods. First, out of the six states that make up Nigeria's Southwest, Ondo and Osun were purposively selected because FBS programme started in the two selected States, and Ondo is the highest cocoa producing state in Nigeria follows by Osun. At the second stage, purposive selection was used to pick four Local Government Areas (LGAs) from each of the states where FBS cocoa farmers are dominant. These were Idanre, Odigbo, Ondo East, Owo in Ondo State and Atakumusa-West, Ayedade, Obokun, Oriade in Osun State. The third stage involved purposive selection of five (5) cocoa growing villages of registered FBS groups with the lists obtained from Farmer Business School Multipurpose Union (FBSMU) in Ondo and Osun chapters, making total of (40) villages that were used for the study. In the fourth stage, in each village, four (4) FBS cocoa farmers were picked at simple random and questioned. A total number of 160 FBS cocoa farmers who were smallholders were used for the study.

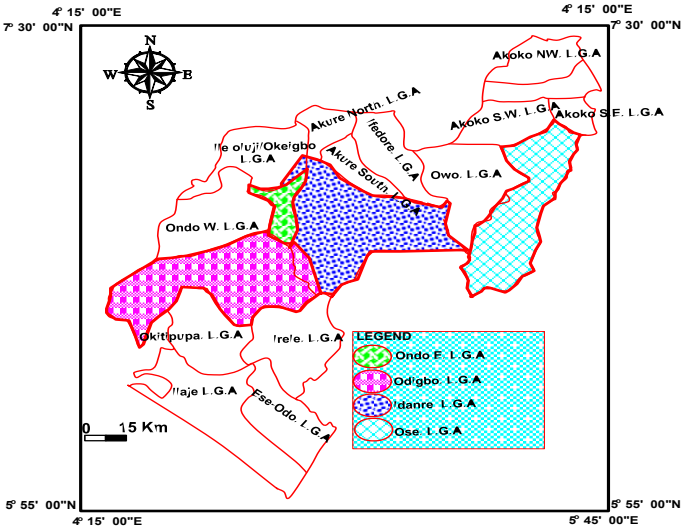

Figure 1: *Map of Ondo State showing the study area.*

Method of data collection

A well-structured questionnaire and interview schedule were used to gather relevant data on the study's specific objectives. The instrument contained open and close ended questions which covered various facts about the farmers' socioeconomic characteristics and cocoa production details. In addition, the veracity of the data was checked through Focus Group Discussions, especially information on qualitative data from FBS farmers.

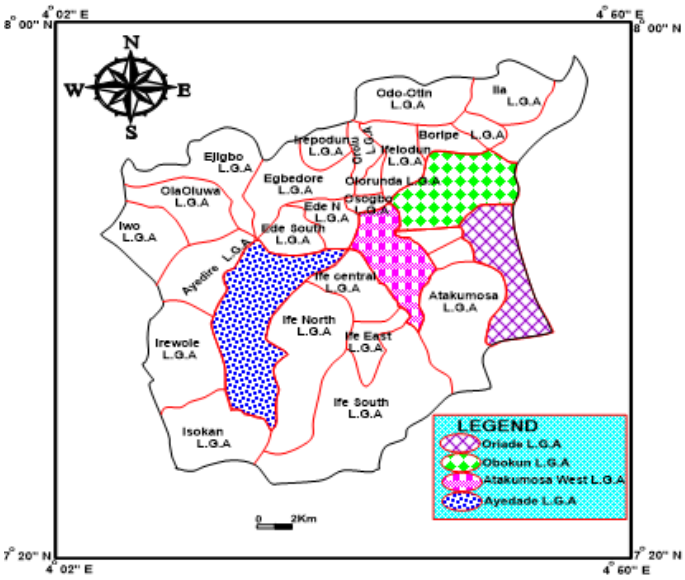

Figure 2: *Map of Osun State showing the study area.*

Statistical analysis and model specification

This study used descriptive statistics (frequency, percentages and mean) to summarize the socioeconomic characteristics of respondents, while budgeting technique and binary logistic regression were employed to evaluate the profitability and utilization, respectively of FBS extension approach by smallholder cocoa farmers in the study area. The degree of utilization was determined by using 4-points Likert scale and rank order technique.

Profitability analysis of FBS smallholder cocoa farmers

The profitability of smallholder cocoa farmers was calculated by using budgeting technique. The budgeting technique involves the gross margin (in Naira) for each FBS cocoa farmer in chosen States which is calculated by subtracting total variable costs from total income.

The cost of labour, agro-chemicals, fertilizers and other miscellaneous charges constitute up the overall variable costs of their production. The total fixed costs (TFC) include; the costs of depreciation in cutlasses, wheelbarrows, files, hoe, motorcycle, baskets and other farm tools and equipment.

The expression is as follows:

$$GM_i = \sum_{n=1}^{n} P_i Y_i - C_i \ldots\ldots (1)$$

Where;

GM_i: Gross margin of farm i measured in Naira; P_i: Farm i's cocoa bean price in Naira per kilogram; Y_i: Farm i's total quantity of cocoa beans in kilogram; C_i:

In Naira, total variable expenditures incurred on farm i; n: Number of cocoa farms in sum.

From equation 1, Total Revenue (TR) equals P_1Y_1, whereas Total Variable Cost (TVC) equals C_1

Therefore;

$$TC = TVC + TFC \ldots\ldots (2)$$

Where;
TFC = Total fixed cost.

Then,

$$Net\ income\ (NI) = TR - TC \ldots.. (3)$$

$$ROI\ or\ RNI = \frac{Profit}{\sum^{TC}} \ldots. (4)$$

ROI or RNI = Return on investment or return on naira investment.

Binary logistic regression model

The binary logistic regression was used to examine the relationship between selected factors affecting the utilization of FBS approach. The binary logit/probit models are widely used economic tools in adoption or utilization studies with a dichotomous dependent variable such as utilization versus non-utilization. Therefore, binary logit model was used in this study because the dependent variable of the model is dichotomous and moreover, the model is easier to compute and interpret (Gujarati, 2003). Based on the comparative advantages associated with the use of binary logit model, as follow Guajarati (2003) is generally written as;

$$\ln\left(\frac{P}{1-P}\right) = Y^*_i = \frac{1}{1+exp^{-(\beta_0+\beta_i X_i+\varepsilon_i)}} \ldots (5)$$

Where;
Y^*_i: Latent dependent variable; ln (P/1-P): Log of odds ratio of utilization/non-utilization; In: Natural logarithm; P_i: Probability of utilizing introduced FBS' innovative skills; 1-P: Probability of not utilising introduced FBS' innovative skills; β_i: Column vector of unknown parameters to be estimated; β_0: Constant; X_i: A row vector of explanatory variables.

The reduced form of equation (2) can be rewritten as;

$$Y_i^* = \beta_0 + \sum_{(k=1)}^{J} \beta_j X_i + \varepsilon_i, \begin{cases} if\ J > 0,\ Y_i^* = 1 \\ otherwise\ Y_i^* = 0 \end{cases} \ldots (6)$$

ε_i = vector of unobserved random effect.

The selection of independent variables into the model was fully guided by previous related literature (Farid *et al*., 2010; Miassi and Dossa, 2018). The explicit function of the equation showing the dependent and independent variables are presented below. Data collected from the field survey were analyzed on IBM SPSS version 23.0.

Description, Measurement of Variables and A Priori Signs

Dependent Variable

Y* = 1, if FBS cocoa farmers utilize FBS innovative skills Y* =0, if FBS cocoa farmers do not utilize FBS innovative skills.

Independent variable

X_1= Age of farmers (measured as actual age of respondent in in year) (-).
X_2= Level of education (number of years spent in schooling) (+).
X_3= Household size (number of persons living under the same roof) (+).
X_4= Extension contact (access to extension services; Yes= 1, Otherwise = 0) (+).
X_5= Farm size (Farmland under cocoa cultivation measured in hectare [Ha]) (+).
X_6= Annual income (Measured as net sales of cocoa beans realized annually in Nigeria currency [₦]) (+).
X_7= Training experience (Training received from various interventions for years) (±).
Ɛi = Error term.

Results and Discussion

FBS Cocoa Farmers' Socio-Economic Characteristics

Table 1 shows the socio-economic characteristics of the respondents. The Table shows that 55.1 % of the respondents were below 50 years of age with a mean value of 48.4 years. This signifies that the farmers in the area of study are still strong to participate effectively in cocoa production.

Also, the results from the table show that 61.2 % of the respondents were male. The dominance of the male (61.2 %) over the female could be related to the reason that there are more male that are invested in cocoa production. The result is supported by Awoyemi and Aderinoye (2019) that cocoa production is mainly dominated by male in Nigeria.

Table 1: *Socio-economic characteristics of respondents (n = 160).*

Variables	FBS F %
Age (in years)	
Less than 30	10 (6.3)
30-49	78 (48.8)
50-69	64 (40.0)
70 and above	8 (5.0)
Mean	48.4
Gender	
Male	98 (61.2)
Female	62 (38.8)
Marital Status	
Single	16 (10.0)
Married	136(85.0)
Widow(er)	8 (5.0)
Level of education	
Tertiary education	28 (17.5)
Secondary school education	69 (43.1)
Primary school education	49 (30.6)
Non-formal education	14 (8.8)
Access to general agricultural extension services	
Access	35(21.9)
No Access	125(78.1)
Household size	
1-5	60 (37.5)
6-10	92 (57.5)
11-15	8 (5.0)
≥16	0 (0.0)
Mean	6.5
Farm size (Ha)	
≤2.5	128 (80.0)
2.51-5.0	28 (17.5)
Above 5	4 (2.5)
Mean	1.07
Annual income ₦	
≤100.000	84 (52.5)
100,001 – 200,000	29 (18.1)
200,001 – 300,000	21 (13.1)
300,001 – 400,000	21 (13.1)
4000,001 – 500,000	3 (1.9)
Above 500,000	2 (1.3)
Mean= ₦51,156.73	

Source: *Field survey, 2019.*

According to data analysis, the bulk of FBS cocoa farmers (85.0%) were married. Marital status is not therefore a barrier to farmers' involvement in the enterprise (Adefemi, 2019; Oke et al., 2020).

Furthermore, 30.6 % of FBS cocoa farmers had primary school education while 43.1 % had secondary education. Level of education among the respondents was not too high with only 17.5 % had tertiary education.

However, over 78.1 % do not have access to general agricultural extension services before the intervention of FBS training programme. Thus, about 57.5 % have household sizes that are more than five with a mean household of 7 people. This indicates that, the farmers have fairly large house hold which might serve as a boost against short fall in supply of farm labor.

Anang *et al.* (2011) stated that, a sizable household can be advantageous for cocoa farmers as, depending on the age of the members of the household, they may be able to rely on family labor rather than hired labor. On the other hand, according to Fountain and Hütz-Adams (2015), a large household, can entail a higher number of dependants, which raises a household's overall living expenses.

However, 80.0 % had their farm size below 2.5 hectares which implies that the majority of respondents are mainly of small-scale category. The information received from the respondents to validate the authenticity and reasons of their experiences during Focus Group Discussion (FGD) revealed that they were confronted with land tenure problem and lack of credit facilities to increase their farm sizes. The result supported the findings of Poelmans and Swinnen (2016) that more than 90% of the world's cocoa is grown by individual farmers that own between one and ten hectares of land and small holder farmers are regarded as people with landholdings of less than 10 hectares. This may likely limit the cocoa output of the respondents and discourage adoption of new cocoa technologies and innovative skills.

Moreover, the results indicate that a significant proportion (52.5%) of FBS cocoa farmers with mean annual income of ₦ 51,156 fell less than ₦ 100,000 they realized annually.

Since many respondents realized less than ₦ 100,000 as their cocoa annual income, they might not be able to adopt or adapt new technologies and innovative skills that could boost and increase their cocoa production because of high cost of management practices involved.

Cost and returns analysis

The results of the budgeting analysis for FBS cocoa farmers are presented in Table 2. It could be seen that the average revenue for each FBS cocoa farmer was found to be ₦ 155,881.25 per annum. The total cost incurred was ₦ 74,746, the gross margin was ₦ 86,369.25 while the net farm income (profit) of ₦ 81,134.65 was realized. The return per capital invested was ₦ 1.09 which was attractive. The implication is that for every naira spent on FBS cocoa farmer' business, one naira and nine kobo would return as profit to the investment. The resultant profit realized may be due to business skills acquired from FBS. This is supported by Kahan (2013) that farmers are under increasing pressure to adapt their agricultural production to market changes in order to increase efficiency, income, and profitability.

Table 2: *Cost and returns of respondents.*

Items	FBS (n = 160) Mean (₦)
Cocoa beans output or yield (kg)yr $^{-1}$	222.69
Price(₦) kg $^{-1}$	700
A. Total Revenue(₦)	155,881.25
B. Expenses	(₦)
Fixed cost	5,234
Variable costs	
Insecticides	27,832
Fungicides	22,972
Fertilizer	12,812
Cocoa Bags	1,409
Labour	
Pruning	616
Removing Mistletoes	146
Sanitary Harvesting	197
Weeding	390
Fertilization	172
Spraying	259
Harvesting	2,378
Fermentation, drying, bagging	328
Total Variable Cost	69,512
Total costs(TFC+TVC)	74,746
Gross Margin (TR– TVC)	86,369.25
Net Farm Income (A – B) (Profit)	81,134.65
Unit Cost (₦Kg^{-1}), Expenses/ Yield	337
ROI or RNI	1.09

***Note:** ₦ 380 = 1US$;* **Source:** *Field survey, 2019.*

Utilization of innovative skill disseminated through FBS approach

Table 3 revealed the reactions of FBS cocoa farmers to a set of FBS' disseminated innovative skills at the four-point Likert Scale on the levels of utilization. The grand mean is 3.26; therefore, the mean value equal or greater than the grand mean is considered "high utilization and otherwise is considered "low utilization". Those innovative skills that are highly utilized thus are; manage your money throughout the year ($\bar{X}$ = 3.76), which is the core center of FBS extension approach, according to Kahan (2013), who stated that farm business is full of business and financial management skills. During FGD, it was realized that in every agricultural venture, expenditure (money out) for the farm and the household are always incurred every month, but revenue (money in) could only be realized after harvesting and selling of agricultural products or produce in some months. Therefore, there are months of the year where the expenditures are greater than the revenues. These are called "deficit months". To this regards, a good agricultural entrepreneur saves money and makes good financial calendar from sales of produce "surplus months" to cover these "deficit months". Furthermore, Principle of farming is business ($\bar{X}$ = 3.73), with this, FBS cocoa farmers were able to plan and organize themselves to purchase inputs, tools, and save money for labour and other activities ready for cocoa production at the right time. Farmers now perceive farming as business as compared to their old mentality when regarded farming as ordinary hobby in the study area. Nonetheless, seize opportunities to diversify farm enterprise for more income ($\bar{X}$ = 3.71), with this, it was realized during FGD that diversification to other enterprises apart from cocoa would reduce risks and uncertainties associated with cocoa production, their personal incomes would increase and with those with diversify cropping, ascertained that they would have more and better food stuffs.

Inversely, innovative skills that have low utilization thus are; know the units to know your assets ($\bar{X}$ = 1.81), the adverse effects of lack of this innovation are that cocoa farmers in the study area would not be able to know precisely their assets, correct plan of production, the quantities of inputs that are needed to be purchased on time, quantity harvested and to correctly evaluate losses or profits. Other innovative skills with low utilization were earning more money by investing in replanting of cocoa ($\bar{X}$ = 2.44) and manage farm for enough food ($\bar{X}$ = 2.59).

Table 3: *Utilization of innovative skills after participation in FBS training (n=160).*

Innovative skills	Not utilized F %	Slightly utilized F %	Moderately utilized F %	Highly utilized F %	Mean $\bar{X}$	Ranks
Manage your profit throughout the year.	0(0.0)	9(5.6)	20 (12.5)	131 (81.9)	3.76	1st
Principle of farming is business.	1 (0.6)	10 (6.3)	20 (12.5)	129 (80.6)	3.73	2nd
Seize opportunities to diversify farm venture for more income	4 (2.5)	8 (5.0)	19 (11.9)	129 (80.6)	3.71	3th
Added value from quality cocoa.	1 (0.6)	14 (8.8)	20 (12.5)	125 (78.1)	3.68	4th
Decisions for doing good business.	3 (1.9)	13(8.1)	19 (11.9)	125 (78.1)	3.66	5th
How to get good financial services.	3 (1.9)	17 (10.6)	30 (18.8)	110 (68.7)	3.54	6th
Becoming an entrepreneur in practice.	6 (3.8)	20 (12.5)	34 (21.3)	100 (62.4)	3.43	7th
Manage risks and uncertainties.	8 (5.0)	19(11.9)	33 (20.6)	100(62.5)	3.41	8th
Money out, money in: know whether you are doing successful business.	8 (5.0)	22 (13.8)	31 (19.4)	99 (61.8)	3.38	9th
Manage farm for enough food.	45 (28.1)	30 (18.8)	30 (18.8)	55 (34.3)	2.59	10th
Earning more money by investing in replanting of cocoa.	50 (31.3)	25 (15.6)	50 (31.3)	35 (21.8)	2.44	11th
Know the units to know assets.	85 (53.1)	30 (18.8)	36 (22.5)	9 (5.6)	1.81	12th

Grand Mean = 3.26; **Source:** *Field survey, 2019*

Table 4: *Results showing the odds estimate of the parameters from the logit regression model.*

	FBS extension approach		
Variable	**Coeff.**	**Z(Wald)**	**Exp(χ)**
Constant	1.82	8.54***	1.76
Age of respondent	-0.99	-16.41***	0.86
Level of education	0.18	3.22***	1.04
Household size	0.17	0.16	0.92
Extension contact	-0.40	-5.69***	1.32
Farm size	0.18	2.33**	1.22
Monthly income	0.13	5.23***	1.78
Annual experience	0.15	0.08	1.12
Model fit summary			
F-statistics	76.57***		
'% Correct classification	82.0		
McFadden' s Pseudo R^2	0.802		

*FBS: -2Log likelihood: χ^2= 65.14***, Hosmer and Lemeshow test (Chi-square): = χ^2 = 7.53 P = 0.413, ***, **, * Sig. at 1%, 5% and 10%, respectively.* **Source:** *Author's own estimation (2019).*

Results of the binary logistic regression for the utilization FBS approach

Results in Table 4 show the parameter estimates and odds ratio estimated from binary logit model. Parameter estimate of socio-economic variables influencing the utilization of FBS' innovative skills was obtained using a stepwise logistic regression method. The decision was taken in order to discard the non-informative variables from the models. The F-statistics with a value of 76.57 at p < 0.01 shows the goodness of fit of the model on the utilization of FBS approach. The Pseudo R-square for the model is 0.802. This value of 80.2% implied the proportion of variation in the utilization of FBS extension approach that was explained by all variables fitted into the model using maximum likelihood estimation method (MLE) in the logistic regression model while the remaining 19.8% is embedded in the error term. To further confirm the suitability of using logit model in this study, the log likelihood statistics of 65.14 indicating the robustness of the model was statistically significant (p < 0.01) and the Hosmer and Lemeshow test (Chi-square) for the model was not violated because the p-value is greater than 5% probability level. Interpretation of findings in this study is based on their odds ratio since coefficient of logit model cannot be interpreted directly (Gujarati, 2003).

Age of cocoa farmer

The logit result shows that there is a negative and significant (p<0 .01) relationship between the age of cocoa farmers and the level of utilization of FBS extension approach. This result is consistent with our *a priori* expectation as well as with the existing literature that older farmers are risk averse and have little interest in long term investment compared to young farmers. The short horizon for older farmers is an indication that such farmer may develop lukewarm attitude towards utilizing FBS packages. The odds ratio for FBS approach is 0.86. The odds ratio for the approach is less than one which implies that an addition

of one year to the age of cocoa farmer, farmers are less likely to utilize FBS approach. It also reveals that a one year increase in farmer's age, the odds of utilizing FBS approach will decrease by 14 % compared to the odds of younger farmers. Younger farmers have longer horizons than older farmers and hence are more willing to accept innovation. This result is consistent with the finding of Gedikoglu (2015) that younger one are more receptive to modern ideas than older ones.

Level of education

Furthermore, the positive and significant ($p < 0.01$) relationship between utilization of FBS extension approach and the farmer's level of education is expected, this is because education promotes adoption of innovation. Higher level of education increases the level of utilization. Educated farmers would utilize progressive new technologies and innovative skills with a view to enhancing their cocoa production. The odds ratio is greater than one which indicates that a cocoa farmer is more likely to utilize FBS extension approach. Put it differently, for every additional one year a respondent spends in schooling, the odds of utilizing FBS extension approach on cocoa production increases by 1.04 times, respectively higher than the odds of a farmer that is not educated.

Extension contact

Moreover, extension service has a positive and significant ($p < 0 .01$) relationship with utilization of business skill taught by FBS. This finding reflects the dependability of farmers on agricultural extension workers on information that are related to FBS approach. A unit increase in the number of visitations to the farmers by the extension worker, farmers will be more likely to embrace FBS packages. Similarly, odds ratio for utilizing FBS approach by cocoa farmer will increase by 1.32 times than the odd of non-visited farmer in the study area.

Farm size

Thus, farm size cultivated also has a positive and significant ($p < 0.05$) relationship with utilization of FBS extension approach. This assumes that as the amount of land used to grow cocoa increases, so does the utilization of FBS extension approach increases. The coefficient of farm size is 0.18 with the corresponding odds ratio of 1.22. The odds ratio is greater than one. The positive sign for this variable is theoretically and consistently agreed with the study *a priori* expectation. This implies that farmers with large scale of cocoa production are more likely to utilize FBS approach compared with farmers that have small-sized farmlands. The result indicates that increasing farm size by a unit, *ceteris paribus*, the odds of utilization of FBS extension approach will increase by 22 % compare to non-users.

Monthly income

In addition, monthly income was significant ($p < 0 .01$) and had positive relationship with utilization of FBS approach. The result here agrees with *a priori* expectation that the higher the income of a farmer, the higher the utilization FBS approach. The probability of utilizing FBS extension approach increases by 78 % compared to the odds of a non-user of the approach.

Training experience

Nonetheless, the results showed that there is no significant relationship between the training experience and utilization of FBS extension approach.

Conclusions and Recommendations

The findings revealed that introducing and using a farmer business school extension approach had aided smallholder cocoa farmers in developing business knowledge and skills that improved the profitability of their farms.

Concerning the issue of utilization of FBS approach' introduced innovative skills, majority of FBS cocoa farmers were highly utilized the concept of managing money throughout the year, principle of farming is business and seize opportunities to diversify farm enterprise for more income.

The findings further revealed that age of cocoa farmers, level of education, extension contact, farm size and monthly income were major predictors influencing the utilization FBS approach.

The findings also showed that know the units to know your assets, earn more money by investing in replanting of cocoa and manage farm for enough food are the major FBS innovative skills that have low utilization.

In conclusion, FBS extension approach enhanced cocoa farmers' business knowledge and marketing skills, and thus increased their income and profitability. The fact that profit of farmers involved in FBS was increased, support the notion that technical know-how is not enough for farmers, but the transformation of this to profitability of agro-business.

The following recommendations were made based on the findings; since low utilization occurred on some introduced innovative skills of FBS extension approach in the study, it is therefore, recommended that those skills that have high utilization and give high profit should be developed and modeled for other cash and food crops while further studies should look into reasons why some skills have low utilization.

Finally, effective general extension services should be extended to the study area to intensify the use of FBS introduced innovative skills by farmers for cocoa production.

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Novelty Statement

This study will provide better information for the cocoa farmers, government, policy makers, international institutes, communities, NGOs, extension facilitators, researchers, planners, and other agencies who are involved in cocoa production to become better entrepreneurs as link to the profitability and utilization of farmer business school extension approach on smallholder cocoa farmers in Nigeria.

Author's Contribution

Oluwaseun Adetarami: The lead researcher.
Babatunde Adebayo Oyebamiji and Adegboyega Abel Odeyemi: Designed the research article, collected, sorted, analyzed data and wrote the article.
Oluwatoyin Olagunju and Sina Basil Johnson: Provided literature review, supervised and proofread the work.

Conflict of interest
There are no conflicts of interest indicated by the authors.

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