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Abstract

The study focused on factors associated with performance of Farmer Field School (FFS) as extension approach to cocoa production in Osun State, Nigeria. Data were gathered through structured interview schedule from 248 cocoa farmers participating in FFS. Data collected were analyzed using descriptive statistical tools such as frequency counts, percentage, mean and standard deviation while inferential statistics such as correlation and chi square were used to test the hypothesis set. Results of the study show that the mean age of cocoa farmers participating in FFS in the study area was 53.3 years with standard deviation of 9.0; majority (79.4%) of them were males, they spent an average of 10.9 years in formal school, the mean of years of experience in cocoa production was 7.5 with standard deviation of 4.8 and they had progressive increase in cocoa output from 2007 to 2009. Furthermore, there was high compliance with the organizational structure and operational strategies recommended by Food and Agriculture Organization (FAO). There were positive and significant relationship between improvement in cocoa management practices and respondents' age ($r = 0.322$; $P \leq 0.05$); years of formal education($r = 0.153$; $P \leq 0.05$); cocoa land size($r = 0.501$; $P \leq 0.01$); years of experience in cocoa production ($r = 0.503$; $P \leq 0.01$). The study also identified five crucial factors associated with performance of FFS as extension approach, which were social factor ($\lambda = 1.0706$); economic factor ($\lambda = 1.2549$); facilitators-related factor ($\lambda = 1.6744$); FFS operational strategies factor ($\lambda = 0.9973$); and community-related factor ($\lambda = 0.4767$). The factors indentified explained 83.50 percent of the variation in the performance of FFS as extension approach to cocoa production in Osun State.

Keywords: Performance, Field school, Extension approach, Management practices, Farmers, Cocoa production

Introduction

The term extension was first used to describe adult education programmes in England in the second half of the 19th century; these programmes helped to expand/ extend the work of universities beyond the campus to the neighbouring communities. The term was later adopted in the United States of America, while in Britain; it was replaced with "advisory service" in the 20th century. Maunder (1973) opined that agricultural extension is a service or system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting social and educational standards.

A plethora of extension approaches have been used to increase agricultural production (like cocoa) such as commodity extension approach, University-based extension approach, ministry-based extension approach, Visit and Training approach with little success. These extension approaches were diffused, non-focused, combining advocacy and advisory roles with input and credit distribution, and regulatory functions.

Some extension scholars Rivera et al. (2001) and Feder et al. (2001) commented on the frequent manifestations of unsatisfactory extension performance observed in this extension approach which tends to be generic and could be applicable to any sector/subsector. These manifestations were due to: the cost of reaching large, geographically dispersed and remote smallholder farmers was high, which reduce the potential of farmer-to-farmer diffusion; competition for budget between extension and research system which created tensions and militates against an effective two-way communication; the use of extension agent for non-extension duties such as collection of statistics, distribution of subsidized inputs, assisting and collecting loan applications, and election campaign

work on behalf of local or national ruling parties; among many others.

It was against this backdrop that National Cocoa Development Committee (NCDC) was set up in 1999. The committee, domiciled in the Federal Ministry of Agriculture and Natural Resources, was given the mandate to promote cocoa production through the design and implementation of Sustainable Tree Crops Programme (STCP) involving new plantings and rehabilitation (rebirth) of old plantations. In effort to fulfill its mandate, NCDC collaborated with International Institute of Tropical Agriculture (IITA) and Cocoa Research Institute of Nigeria (CRIN) in 2003 to find a blueprint for reviving the cocoa economy in Nigeria making use of Farmer Field School (FFS) as an extension approach.

The term "farmer field school" originated from Indonesia expression *Sekolah Lapangan* meaning just field school. It was conceptualized between 1970s and 1980s and first implemented in Indonesia in 1989 by the Food and Agriculture Organization (FAO) of the United Nations (UN) to deal with the wide spread of pest out-breaks in rice that threatened the security of Indonesia's basic food supplies (Pontius, 2002). In his own contribution, Gallagher (2003) posited that FFS is a non-formal training programme that grew out of the T&V system. It is a participatory training approach, group extension method and a form of adult education whereby farmers of similar interest (25- 30 in number) who meet regularly during the course of a growing season to experiment as a group with new production management options are given opportunity to make a choice in the methods of production through discovery based approach. Farmer Field School curriculum is dictated by the specific production system, priority problems and local condition of the farmer groups. It may cover the entire crop/ livestock cycle and collection of group dynamic exercises, there were also inclusion of social messages like child labour and Human Immuno-deficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS) integrated into the capacity building activities of FFS (Davis 2005; Adeniyi and Adeogun 2005).

Due to remarkable success achieved with the use of FFS in other countries, Cocoa Rehabilitation Programme (CRP) that is domiciled in Federal Ministry of Agriculture and Natural Resources also used FFS as its extension approach in the 14 cocoa producing states in Nigeria (Abia, Adamawa, Akwa-Ibom, Cross River, Delta, Edo, Ekiti, Kogi, Kwara, Ogun, Ondo, Osun, Oyo and Taraba) as part of cocoa rebirth strategies. The collaboration between the CRP Committee and the International Institute of Tropical Agriculture (IITA)/ Sustainable Tree Crops Program (STCP) made use of Ondo State (being the highest cocoa producing state in Nigeria) as Pilot Phase for 3 years (2003-2006).

The positive results of the Impact Assessment Study of the 3- year Pilot Phase in Ondo State informed the plan to replicate the use of FFS in the rest 13 cocoa producing states (Federal Ministry of Agriculture and Natural Resources, 2007). FFS for cocoa farmers started in Osun State in 2007, there were 30 schools as at the time of conducting this research. The cocoa FFS metamorphosis to "Kokodowo" Cooperative Farmers' Union, a replica of "Tonikoko" Cooperative Farmers Union of Ile-Oluji in Ondo State (Osun State Ministry of Agriculture and Natural Resources, 2009). There is need to assess factors associated with performance of the approach in enhancing cocoa production.

Objective of the study

The main objective of the study was to assess factors associated with performance of FFS as an extension approach to cocoa production in Osun State, while the specific objectives were to

i. determine the socio-economic characteristics of cocoa farmers participating in FFS in Osun State;
ii. investigate the operational strategies of the FFS; and
iii. assess the factors influencing the performance of FFS in the study area.

Research hypotheses

Three null hypotheses were evaluated in the study, these are:

i. There is no significant relationship between selected socio-economic characteristics of FFS participants and improvement in cocoa management practices.

Research Methodology

Osun State was purposively selected for the study, being one of the states with largest cocoa hecterage in Nigeria (CRIN, 2008). The study was carried out in all 30 FFS in the four Cocoa circles of Osun State, namely: Ede, Osogbo, Ilesa, and Ife. Two-third of the FFS in each circle was randomly selected; 6 from Ilesa, 4 from Ede, 4 from Osogbo, and 6 from Ife. The selected FFS with their numerical strength were; *Imoro* (24), *Iyere* (26), *Temidire* (26), *Igbagiri* (28), *Ibala* (26), *Araromi-Erinmo* (28), *Mokoore* (22), *Obansola* (24), *Ayetoro* (20), *Abeere* (26), *Oba-Ile* (22), *Ajaba-ila*

(26), *Dagbolu* (24), *Eleesun* (24), *Obalaayan* (28), *Famia* (24), *Koola* (26), *Akala-Oyan* (22), *Abiri* (26), *Wanikin* (24). Finally, a systematic random sampling technique with a random start at an interval of two using farmers' register as sampling frame was used to select fifty per cent of farmers from each FFS. A total of 248 respondents were interviewed for the study. Validated and pre-tested interview schedule was used to elicit information on socio-economic characteristics. The data were summarized using descriptive statistics; factor analysis was used to identify the crucial factors associated with performance of FFS while chi-square and correlation analyses were used to make inferences from the hypotheses.

Measurement of Variable

The dependent variable was conceptualized as cocoa FFS participants' improvement in management practices as a result of their participation in FFS. There were 19 cocoa management practices emphasized during the FFS. The dependent variable was measured by calculating the total improvement score of each respondent from indicators arising from cocoa management practices emphasized during the FFS. The reaction was against a 4-point scale of improvement ranging from Large Extent (4 points), Some Extent (3 points), Little Extent (2 points), and No Extent (1 point) as used by Mustapha (2003). The possible minimum/maximum score that a respondent had was calculated by multiplying the number of indicators considered (19) by the least or highest point scored by each of the respondent; that is, maximum score of 76 and minimum score of 19. The total score per respondent was further classified into three categories of improvement as follows: low, moderate and high improvement using mean of total improvement score plus/minus standard deviation.

Results and Discussion

Socio-economic characteristics of Cocoa farmers participating in FFS

This section presents information on the socio-economic characteristics of cocoa farmers participating in FFS such as age, gender, years of formal education, status in the community, cocoa farm size, sources of cocoa farmland, and years of experience in cocoa production, reasons for cocoa cultivation, cocoa breed planted and cocoa output.

Table 1: Distribution of cocoa farmers participating in FFS by selected personal characteristics n=248

Variables	Frequency	Percentage	Mean	Std. Dev.	Variables	Frequency	Percentage	Mean	Std. Dev.
Age (years)					***Sources of farmland**				
<31	4	1.6			Rent/Lease	11	4.4		
31-60	199	80.2	53.3		Inheritance	207	83.5		
>60	45	18.1			Outright purchase	79	31.9		
Gender					**Years of experience in cocoa production**				
Male	197	79.4			<11	216	87.1		
Female	51	20.6			11-20	25	10.1	7.5	4.8
Years of formal education					>20	7	2.8		
<7	69	27.8			**Cocoa breed planted**				
7-12	99	39.9			Local	42	18.5		
>12	80	32.3			Improved	55	22.2		
Cocoa farm size (Hectares)					Both	193	77.6		
<2.8	127	51.2							
2.8-4.8	108	43.5	7.1	3.1					
>4.8	13	5.2							

Source: Field survey, 2010, * Multiple responses

Table 1 revealed that the age of cocoa farmers participating in FFS in Osun State was between 30 and 72 years, their mean age was 53.3 years with standard deviation of 9.0. It was evident that few

youth participated, which might be connected with the fact that young people were very much involved in rural-urban migration in search of greener pasture. Furthermore, it was also revealed that majority (79.4%) of the cocoa farmers were males, this implies that male dominated cocoa farming in the study area. The table also showed that the mean of years spent in formal schools was 11 with standard deviation of 4.5; this revealed that majority could read and write which would help them understand extension recommendations better. Many (51.6%) of them were indigenes, this revealed that difference in number between the indigenes and non-indigenes was marginal.

The mean cocoa farm size was 2.84 hectares with standard deviation of 3.1; this might be connected with the land fragmentation caused by inheritance. The table shows that majority (83.5%) of cocoa farmers participating in FFS inherited their cocoa farmland, 31.9 percent purchased their cocoa farmland, while only 4.4 percent rent/lease their cocoa farmland. This may be a very good thing for the farmers as they do not need to be bordered about incurring some production cost like capital to purchase land, rentage cost and royalty annually. The mean of years of experience in cocoa production was 26.9 years with standard deviation of 11.5; these relatively long years of experience in cocoa production is likely to have exposed the cocoa farmers in terms of experience in cocoa production and related information. About 18.6 percent of the cocoa farmers still stick to the local breed while the good news was that majority (77.8 %) are combining the two breeds which is an indication of shift towards the adoption of improved variety.

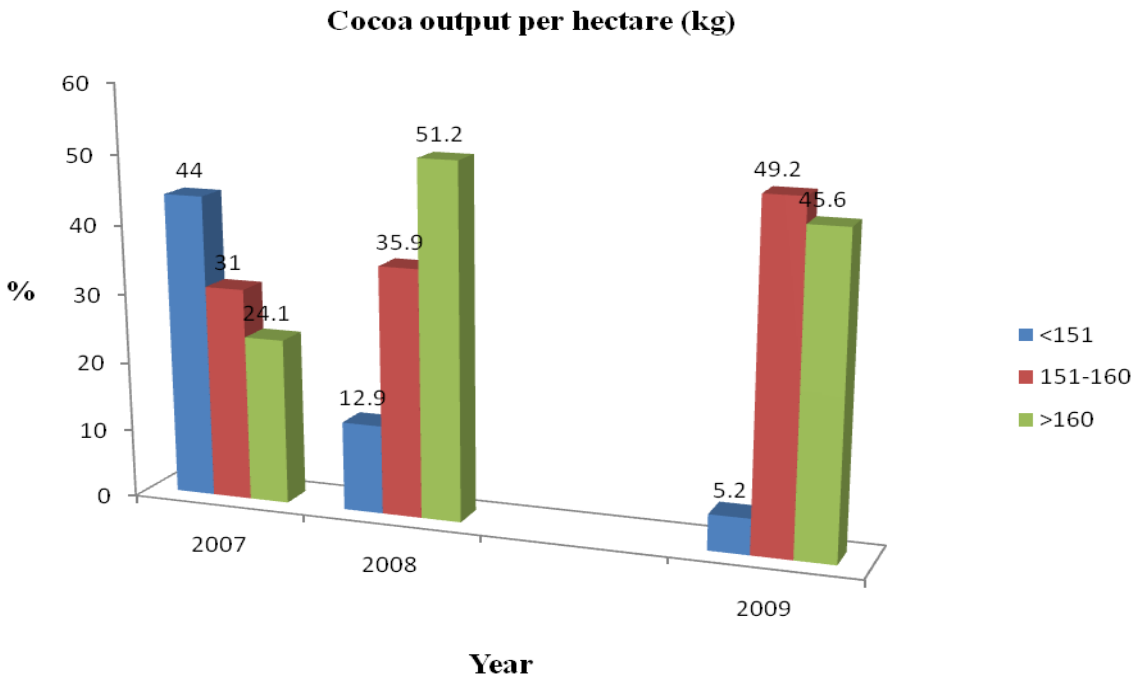

Fig. 1: Distribution of respondents according to their cocoa output

Source: Field survey, 2010

The result in Figure 1 revealed that cocoa output mean for 2007, 2008 and 2009 were 154.2, 165.1, and179.3, respectively also the standard deviation for 2007, 2008 and 2009 were 9.3, 9.1 and 9.1, respectively. This finding shows that there was a progressive increase in cocoa output of the respondents from 2007 to 2009. This might be connected with the relative advantage of FFS over other extension approaches used in the study area.

Table 2: Distribution of the respondents by operational strategies of cocoa FFS
n =248

Variables	Frequency	Percentage
Locality of FFS participants		
Same locality	235	94.8
Not same locality	13	5.2
Accessibility of FFS location		
Very accessible	202	81.5
Accessibility	32	12.9
Fairly accessible	10	4
Not accessible	4	1.6
Meeting in a month		
Fortnightly	248	100
Emergence of executives		
Selection	204	82.3
Appointment	34	13.7
Imposition	10	4
***Methods of learning**		
Exchange/sharing of experience	214	73.4
Teaching from facilities	62	19.4
Technology transfer	23	7.2
Who decide FFS curriculum		
Facilitators only	72	28.6
Government	33	13.3
Participants and facilities	133	58.1

Source: Field survey, 2010
* Multiple responses

As revealed from the registers of the school, the average numerical strengths of FFS in the study area was 24.80 with standard deviation of 2.06. This falls in line with the recommendation of Soniia *et al.* (2006) of 20-30 participants per FFS. This range of number enhances manageability and maximizes participation in the group.

The result in Table 2 revealed that: majority (94.8%) of the respondents were from the same locality, the very few (5.2%) respondents that were from distant locality may be connected with absentee farmers and those that keep dual residency; majority (81.5%) of the respondents indicated that FFS location was very accessible, Only a few participants (1.6%) indicated otherwise; the respondents meet fortnightly at the FFS location, this enhances free flow of relevant information and interaction among the participants which is very important to acquiring appropriate management practices for better production, there is also informal visitation between the fortnight meetings among the farmers with or without the presence of facilitator.

It also revealed that: majority of the executive members emerge through selection which was in agreement with the principle of FFS (Soniia et al. 2006; Asare and David, 2009) which recommended that FFS executives should emerge through selection by the participants themselves, this implies that there was internal democracy in the school. This type of leadership emergence helps the farmers to develop a better sense of worth and depict that they are in control of the situation in the group; also, it is tenure-based and could be impeached for lack of performance. The situation is different in T and V, because the contact farmer are been chosen by the extension agent and the post is permanent so far as the contact farmer collude with the extension agent even at the detriment of other farmers.

In addition, Table 2 revealed that: the main method of learning in the FFS were exchange/sharing of

experience, This method is advantageous in the sense that there is no need for materials, they are very lively and easy for participants to relate it to the real situation; they allow participation by all, can lead to change of attitudes and collection of many ideas in a short time is made possible. The method used in T&V is mainly teaching in which the target audience do not have the opportunity to participate fully in learning situation; that 58.1 percent of cocoa farmers participating in FFS indicated that FFS curriculum was decided by the participants themselves and facilitators, 28.6 percent of the respondents indicated that FFS curriculum was decided by the facilitators only, while only 13.3 percent of the respondents indicated that FFS curriculum was decided by the government. This is in agreement with the report of Sones and Duveskog (2003); and Gallagher (2003) that indicated that FFS curriculum in Kenya were dictated by participating farmers themselves and their facilitators.

Table 3: Distribution of the respondents by improvement in cocoa management practices

n = 248

Variables	LitE (F(%))	SE (F(%))	LagE (F(%))	Mean	Rank
Appropriate soil selection	20(8.1)	137(55.2)	89(35.9)	3.26	13th
Appropriate land tillage	33(13.3)	160(64.5)	55(22.2)	3.08	16th
Appropriate choice of planting materials	4(1.6)	98(39.5)	146(58.9)	3.57	10th
Appropriate spacing during	16(6.5)	121(48.8)	111(44.8)	3.38	11th
Planting of cocoa seedling Nursery establishment	10(4.0)	45(18.1)	193(77.8)	3.74	9th
Weed control	0(0.0)	34(13.7)	214(86.3)	3.86	7th
Removal of moss and epiphytes	0(0.0)	20(8.1)	228(91.1)	3.91	6th
Fertilizer application	105(42.3)	130(52.4)	13(5.2)	2.64	19th
Pruning	0(0.0)	6(2.4)	242(97.6)	3.98	3rd
Proper shade management	0(0.0)	14(5.6)	234(94.4)	3.94	5th
Sanitary harvesting (Removal of sick pods)	0(0.0)	11(4.4)	237(95.6)	3.96	4th
Pest control (Insecticides spraying)	0(0.0)	8(3.2)	240(96.8)	3.83	8th
Disease control (Fungicides spraying)	0(0.0)	46(18.5)	240(96.8)	4.02	1st
Appropriate cocoa pod harvesting techniques	3(12.5)	175(70.6)	42(16.9)	3.04	18th
Appropriate cocoa pod breaking techniques	31(12.5)	169(68.1)	48(19.4)	3.07	17th
Appropriate cocoa beans fermentation techniques	4(1.6)	4(1.6)	240(96.8)	4	2nd
Appropriate cocoa beans drying techniques	13(5.2)	162 (65.3)	73(29.4)	3.24	14th
Appropriate cocoa beans bagging techniques	0(0.0)	193(77.8)	55(22.2)	3.22	15th
Appropriate cocoa beans weighing/selling techniques	2(0.8)	152(61.3)	94(37.9)	3.37	12th

Source: Field survey, 2010

Large Extent= LagE, Some Extent = SE, Little Extent= LitE

*** Source:** Soniia et al. (2006) A Guide for Conducting Farmer Field Schools on Cocoa Integrated Crop and Pest Management, International Institute of Tropical Agriculture. Accra, Ghana.

The result in Table 3 revealed that cocoa farmers participating in FFS had recorded increase in improvement in their cocoa management practices as a result of their participation in FFS except very few (0.8%) that had recorded no increase in improvement in appropriate soil selection for cocoa production. It was revealed further that the highest improvement (4.02) in cocoa management practices was in disease control (fungicides spraying), followed by appropriate cocoa beans fermentation techniques (4.00), pruning (3.98), sanitary harvesting (3.96), and shade management (3.94) in that order. The improvements mean score was 66.9 with standard deviation of 4.1. This finding revealed that majority (82.26%) of the respondents had commendable improvement in their cocoa management practices as a result of participation in FFS.

This finding implied that these (disease control, cocoa beans fermentation techniques, pruning,

sanitary harvesting, and shade management) were the major management practices the respondents needed improvement on which represent part of the problems identified to be addressed by FFS in the study area. This finding was in consonance with previous studies on cocoa production (Cocoa Research Institute of Nigeria (CRIN) (2008); Food and Agriculture Organization Statistics (FAOSTAT), 2009; Nkang, *et, al.* 2009) which reported that, there were great improvement in activities (management practices) of farmers due to participation in FFS extension approach.

Table 5: Correlation analysis showing the relationship between improvement in cocoa management practices and socio-economic characteristics of the cocoa farmers

Variables	Correlation coefficient (r)	Coefficient of determination (r^2)
Age	0.322*	0.1037
Years of formal education	0.153*	0.0234
Cocoa land size	0.501**	0.251
Year of experience in cocoa production	0.503**	0.253

Source: Field survey, 2010
** and * Significant at the 0.01 and 0.05 level respectively

Result in Table 5 revealed that at 0.01 level of significance, cocoa land size (r=0.501); and years of experience in cocoa production (r=0.503) of the cocoa farmers had significant and positive relationship with improvement in cocoa management practices due to their participation in FFS. Thus the higher the size of cocoa land size and years of experience in cocoa production of the respondents, the higher their improvement in cocoa management practices. Also at 0.05 level of significance, the respondents age (r=0.322) and years of formal education (r=0.153) had significant and positive relationship with improvement in cocoa management practices due to their participation in FFS. Thus, the higher the age and years of formal education of the respondents, the higher their improvement in cocoa management practices.

Table 6: Results of Chi-Square analysis of the relationship between socio economic characteristics of respondents and improvement in their cocoa management practices

variables	χ^2-value	C	DF
Gender	110.79	0.556	14
Source of farmland	23.01	0.461	28
Cocoa breed planted	161.48	628	28

Source: field survey, 2010, C= Coefficient of contingency
* Significant at P < 0.05, DF= Degree of freedom

The results in Table 6 show that at 0.05 level of significant, there was no significant association between source of farmland (χ^2=23.01) of the respondents and improvement in their cocoa management practices. This implies that improvement in management practices of the cocoa farmers was not a function of source of farmland. That is, irrespective of the source of farmland, improvement in management practices among all the respondents was not different, while gender (χ^2=110.79) and cocoa breed planted (χ^2=161.48) were significantly associated with improvement in cocoa management practices. The contingency coefficient revealed a strong association between gender (C=0.556) and cocoa breed planted (C=0.628) and improvement in management practices.

Table 7: Factor analysis showing variables influencing the operation of FFS

Factors and contributing variables	L	L2	λ
1. Economic factor			
Cocoa output	0.503	0.253	
Cocoa land size	0.68	0.4624	1.0706
Years of experience in cocoa production	0.596	0.3552	
2. Social factor			
Participants' age	0.44	0.1936	
Participants' sex	0.618	0.3819	
Social group membership	0.417	0.1739	1.2549
External orientation	0.711	0.5055	
3. Facilitators' factor			
Integrity	0.582	0.3387	
Commitment	0.393	0.1544	
Desired technical skills	0.602	0.3624	
Communication skills	0.44O	0.1936	1.6744
Facilitation skills	0.543	0.2947	
Organization skills	575	0.3306	
4. FFS operational strategies factor			
Accessibility of FFS location	0.545	0.297	
Emergence of FFS executives	0.561	0.3147	0.9973
Membership of FFS	0.621	0.3654	
5. Community factor			
Community attitude towards FFS	0.551	0.3036	0.4767

Presence/ absence of conflict	0.416	0.1731	

Source: Field survey, 2010
Significantly contributing at 0.05 percent
L= Loading for factor, L^2= The square of loading factor
λ= Latent root for the factor ($\sum L^2$)

Table 8: Factors' names and percentage variation accounted for by each factor associated with performance of FFS as an extension approach

Factors	Name	%variance	Cumm.%var
1	Economic	21.8	21.8
2	Social	20.2	42
3	Facilitators	19.2	61.2
4	FFS organizational structure	12	73.2
5	Community	10.3	83.5
6	Others	16.5	100

Source: Field survey, 2010

The factor analysis carried out as revealed in Table 7 indicated that factors that contributed mostly to performance of FFS as extension approach to cocoa production in Osun State were economic (λ= 1.0706); social (λ= 1.2549); facilitators' (λ=1.6744); FFS operational strategies (0.9973) and community (0.4767) among others. Result in Table 8 revealed that factors indentified explained 83.50 percent of the variation in the performance of FFS as extension approach to cocoa production in Osun State.

Conclusion

Performance of extension approach to cocoa production must be seen as a major concern for the nation as it affect it production both in quantity and quality. it was established that the factors that contributed mostly to performance of FFS as extension approach to cocoa production in Osun State were economic factor; social factor; facilitators' factor; FFS operational strategies factor and community factor among others.

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