

# Impact of Cocoa Resuscitation Programme on Farmers' Livelihoods in South West, Nigeria

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## Summary

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This study evaluated the impact of cocoa resuscitation programmes on farmers' livelihood in South West, Nigeria. Before and after evaluation model combined with project participants and non-project participants' model were used to established impact of the programme on participants' livelihoods. Descriptive and inferential statistics were used to analyse the data. A total of 240 farmers were interviewed. Focus group discussion was also held in some of the villages selected. The major cocoa intervention programmes carried out were distribution of free cocoa seedlings to farmers and training on cocoa rehabilitation techniques (coppicing, phase replanting, selective tree replanting, chupon regeneration, and complete farm replacement). Cocoa resuscitation programme had made significant impact in increasing the revenue of participating farmers ( $t = 3.106$ ;  $p \leq 0.05$ ). Higher proportion (77.5%) of the participating farmers find it very easy to access modern farm tools and seedlings, about 20% of the participating farmers rated their standard of living as better than others in the community. Household materials possessed by participating farmers increased drastically. The study recommended that the programme should be scale up to involved more cocoa farmers and sustain cocoa production. This could be achieved by establishing special trust fund for cocoa development in cocoa producing state by both state and federal government of Nigeria.

## Key words

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impact; evaluation; cocoa; resuscitation programmes; livelihood

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## Introduction

Agricultural activities constitute the mainstay of a large proportion of African population. In Nigeria, agriculture has remained the largest sector of the economy. It generates employment for about 70% of Nigeria's population and contributes about 40% to the Gross Domestic Product (GDP) with crops accounting for 80%, livestock 13%, forestry 3% and fishery 4% (Federal Republic of Nigeria, 2006). The tree crop sub-sector, of which cocoa is a major component is very important in African agriculture and contributes significantly to the income of farmers. The relevance of cocoa to most developing economies cannot be overemphasized as cocoa is produced by more than fifty developing countries across Asia, Africa, and Latin America, all of which are in tropical or semi-tropical areas (Ogunleye and Oladeji, 2007).

Cocoa is an important crop to the economies of some countries such as Nigeria, Cote D'Ivoire, Ghana and Cameroon in West Africa. Cocoa was one of major foreign exchange earners in Nigeria before the discovery of crude oil in 1957. This accounted for a greater part of the foreign exchange generated for the country between the 1950s and 70s. It is a source of employment to millions of people, from farmers to processors, licensed buying agents (LBA), ware housing agents and brokers.

Abandoning of agriculture as a result of the discovery of petroleum; unsuitable agricultural policies, non-availability and high cost of cocoa production inputs; over-aged and low yielding trees; old agronomic practices and lack of credit to cocoa farmers among others have led to a decline in cocoa production in Nigeria (Akinagbe, 2015; Federal Government of Nigeria, 2007). In realisation of the importance of cocoa to the economy of Nigeria, the Federal Government of Nigeria, in 1999 started cocoa resuscitation programme with the objectives of providing inputs; organizing trainings on cocoa rehabilitation techniques, cocoa fermentation and nursery management practices of cocoa; and distributing improved variety of cocoa seedlings to farmers. Cocoa rehabilitation is the process whereby unproductive cocoa farms can be made productive by extending the economic life of a cocoa plantation. The different types of cocoa rehabilitation techniques/resuscitation programmes carried out by government agencies in Nigeria include coppicing or chupon regeneration, phase replanting, selective tree replanting or gapping up, complete farm replacement, planting of young cocoa seedlings under old trees, and improved chupon regeneration.

From the foregoing, and after some years of the existence of the cocoa resuscitation programme, the pertinent question is, in what way has the programme imparted the cocoa farmers' livelihood? The component of livelihoods could entail human, financial, social, natural and physical capital. This study focused on the financial and physical materials acquired by the farmers required for a means of living. The overall objective of the study was to evaluate the impact of cocoa resuscitation programmes on farmers' livelihood in South West, Nigeria.

## Theoretical framework

Impact evaluations seek to answer cause-and-effect questions. Unlike general evaluations, which can answer many types of questions, impact evaluations are structured around one question: What is the impact (or causal effect) of a programme on an

outcome of interest? An impact evaluation looks for the changes in outcome that are directly attributable to the programme (Gertler *et al.*, 2011). There are two types of quantitative impact evaluations: *ex post* and *ex ante*. An *ex ante* impact evaluation attempts to measure the intended impacts of future programmes and policies, given a potentially targeted area's current situation, and may involve simulations based on assumptions about how the economy works (Bourguignon and Ferreira, 2003; Todd and Wolpin, 2006). *Ex post* evaluations, in contrast, measure actual impacts accrued by the beneficiaries that are attributable to programme intervention. One form of this type of evaluation is the treatment effects model (Heckman and Vytalil, 2005). The challenge of an impact assessment is to create a convincing and reasonable comparison group for beneficiaries in the light of the missing data.

Ideally, one would like to compare how the same household or individual would have fared with and without an intervention or "treatment." But one cannot do so because at a given point in time a household or an individual cannot have two simultaneous existences—a household or an individual cannot be in the treated and the control groups at the same time. Finding an appropriate counterfactual constitutes the main challenge of an impact evaluation. How about a comparison between participant and non-participants groups when both are eligible to be treated? How about a comparison of outcomes of treated groups before and after they are treated? These potential comparison groups can be "counterfeit" counterfactuals. These two "counterfeit" estimates of the counterfactuals are (1) before-and-after, or pre-post, comparisons that compare the outcomes of program participants prior to and subsequent to the introduction of a program and (2) with-and without/ participant/non-participant comparisons between units that choose to enrol and units that choose not to enrol.

Comparing before and after attempts by tracking changes in outcomes for program participants over time established the impact of a programme. To return to the basic impact evaluation formula, the outcome for the treatment group ( $Y | P = 1$ ) is simply the post-intervention outcome. However, the counterfactual ( $Y | P = 0$ ) is estimated using the pre-intervention outcome. In essence, this comparison assumes that if the program had never existed, the outcome ( $Y$ ) for program participants would have been exactly the same as their pre-program situation. Unfortunately, in the vast majority of cases that assumption simply does not hold.

Comparing participant that receive a programme (programme participant) to units that do not receive it (programme non-participants) ("with and- without") constitutes another counterfeit counterfactual. Reflexive comparisons may be useful in evaluations of full-coverage interventions such as nationwide policies and programs in which the entire population participates and there is no scope for a control group. Even when the program is not as far reaching, if outcomes for participants are observed over several years, then structural changes in outcomes could be tested for (Ravallion, 2008).

## Methodology

The study was carried out in South West Nigeria (Figure 1). The South West lies between latitude 50N and 90N of the Equator

and longitudes 2.50 and 60 East of the Greenwich Meridian. It is bounded by the Atlantic Ocean in the South, Kwara and Kogi states in the North, Anambra state in the Eastern Nigeria and Republic of Benin in the West (Shaib *et. al.*, 1997). Presently, five (5) out of the six (6) States in South West Nigeria produce cocoa and they are grouped into high (Ondo and Osun) and medium producing (Ogun, Oyo and Ekiti) states (NCDC, 2005). The two (2) high cocoa producing States (Ondo and Osun) were selected for the study because of their significant contributions to cocoa production in Nigeria, while Ekiti State was randomly selected using simple random technique from the medium producing states. Hence, a total of three (3) cocoa producing States (Ondo, Osun and Ekiti) were selected for the study.

All cocoa farmers in southwest Nigeria involved in cocoa resuscitation programme constituted the population for this study. Multi-stage sampling technique was employed in selection of respondents. From each of the three states selected for the study, two high cocoa producing Local Government Areas (LGAs) were purposively selected, giving a total of six LGAs for the study. These six-cocoa producing LGAs were: Idanre and Ondo East LGAs in Ondo state; Ife-East and Atakumosa-West LGAs in Osun State and Gbonyin and Ise/Orun LGAs in Ekiti State. From each of the six LGAs selected for the study, a list of ten (10) high cocoa producing villages was obtained. From the list, four villages were selected through simple random sampling technique, giving twenty-four (24) villages for the study (eight villages per State).

From each of the twenty-four (24) villages, a list of registered ten (10) cocoa farmers who were cocoa resuscitation programme participants was collected from the cocoa farmers' association and cooperative society of the selected villages through the help of agricultural extension agents. From the list, five (5) participating cocoa farmers were selected through simple random sampling technique. Also, from the same communities, five non-participating cocoa farmers (control group) were purposively selected from each community, because they did not participate in cocoa resuscitation programme. This shows that a total of one hundred and twenty (120) participating and one hundred and twenty (120) non-participating cocoa farmers respectively, were selected for the study, making a total of two hundred and forty (240) cocoa farmers that constituted the sample size for the study.

Data for the study were collected from the respondents using structured interview schedule and focus group discussion (FGD). The evaluation models used in this study are before and after evaluation model combined with participants and non-participant model. Since majority of the farmers were not used to keeping records of events, their responses were purely on memory-recall. Since, Casley and Lusy (1982) and Ladele (1991) maintained that any memory-recall data, collected as satisfactory as possible, are valid for use in social research, therefore, this research based on memory recall of farmers' activities was considered valid.

To determine the impact of cocoa resuscitation programmes on farmers livelihood, before and after evaluation model was used. The impact of the programmes on the farmers was measured in terms of what the situation was before and after inception of the programmes. The following variables were examined among others: farm size, level of annual income, possession of household materials, perception of living standard, membership

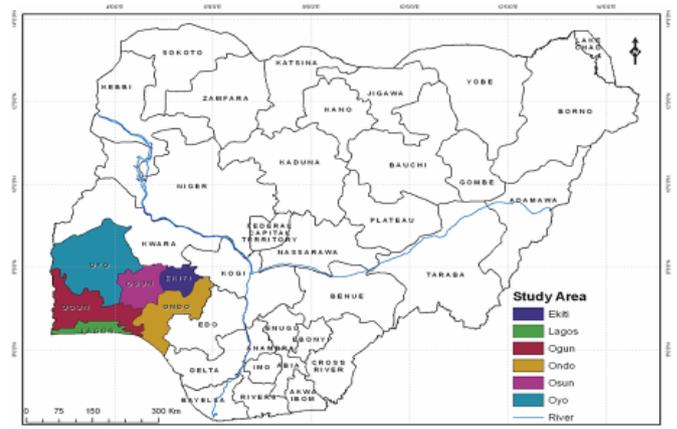


Figure 1. Map of Nigeria, showing the South West

of social organization and number of livestock possessed. Farmers were asked to state the actual farm size in hectare, the quantity of cocoa beans harvested in kg and in bags. (A standardized cocoa bag weighs 64 kg; however, only 62.5 kg of cocoa beans are found in a bag). Yield per hectare was calculated as the average cocoa output divided by farm size. Cocoa farmers were asked to state the exact amount incurred per annum as expenditure in land preparation, labour, fungicides, insecticides, and herbicides among others. This is known as Total variable costs (TVC). Cocoa farmers were asked to state the total revenue received from the sales of cocoa products. Gross margin (GM) was calculated as the total revenue less total variable cost. Return on investment (RI) was calculated as the ratio of the gross margin to the TVC.

Content and face validity were carried out to ensure that the instruments collected the data they were meant to collect. Academic expert and practitioners in the field of academics and cocoa production experts were given copies of the instruments to validate before they were administered to the farmers. The instruments were pre-tested in Ile-Oluji, Ondo State, one of the villages not included in the study area for the purpose of removing ambiguities and making necessary adjustment. Data were collected in year 2010-2011. Results were analysed and presented using percentage, charts, mean statistic and t-test. The statistical package for social sciences (SPSS) version 16 constituted the package used in analysing the data.

## Results and discussion

### Socio-economic characteristics of the respondents

Results in Table 1 revealed that the mean age of participants was 57.1 years, while the mean age of non-participants of cocoa intervention programme known as control group was 56.8 years. The fact that the mean ages of participants and control group were about 57%, respectively, implies that, the cocoa farmers were mature. Hence they should be able to take rational decisions concerning cocoa production improvement since old age could influence productivity and farm decision making process (Akinngbe and Ajayi, 2012). Majority (75.8% and 70.0%) of the participants and control group were male. This may be because

of the tediousness of cocoa farming activities where majority of male constitute the population. Also, majority (94.2% and 86.7%) of the participants and the control group were married. It could be inferred from this finding that, only about 29% and 34% of participants of cocoa resuscitation programme and the control group, respectively had no formal education, hence the cocoa farmers could be described as literates who could read and write. The average household size of the beneficiary cocoa farmers and the control group farmers were 5 and 4 persons, respectively. Cocoa farmers with large household size are capable of readjusting to sudden changes in labour supply at peak periods of labour demand.

The mean cocoa plantation ages for the participants and the control group were 32.0 and 31.7 years, respectively as indicated in Table 1. The optimum economic life of cocoa plantation, according to Oshikalu in Idowu *et al.* (2007) was 30 years. Based on this result, the cocoa plantation in the study area were older than 30 years. This is an indication that the cocoa trees in the zone would have become less productive, hence the need for meaningful renovation. The mean cocoa farming experience for the beneficiary cocoa farmers and control group were 23.7 and 22.9 years, respectively. These findings imply that the farmers had long period of cocoa farming experience that could serve as an advantage for increased improved knowledge in cocoa resuscitation programmes since farmers with many farming experiences could be considered very effective in running day-to-day cocoa farming activities.

#### Market outlets for sale of cocoa beans

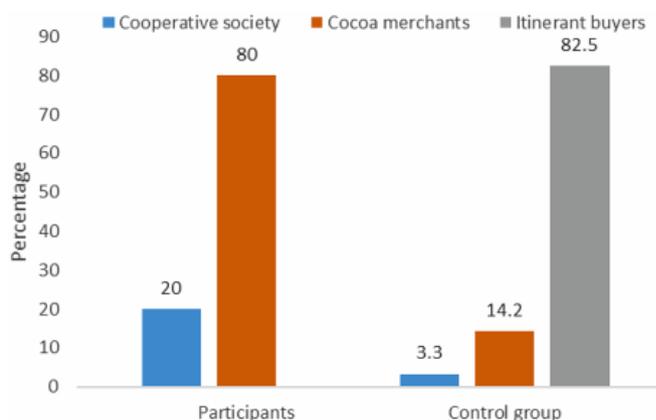
The various market-outlets adopted by the cocoa farmers for sales of cocoa beans are shown in Figure 2. Majority (60.0%) of the participants of cocoa resuscitation programme patronized cocoa merchants for sale of their cocoa beans, while 82.5% of the control group patronized itinerant buyers. This implies that the most patronized outlets for both groups are the cocoa merchant and itinerant buyers. This agrees with the finding of Ogunleye and Oladeji (2007). In their study, they discovered that the most patronized outlets in for sales of cocoa beans in Ila LGA of Osun state were itinerant buyers. Itinerant buyers are people that moved from village to village like middlemen to buy produce (dried or fresh cocoa beans). During the focus group discussion, the respondents noted that many farmers adopted this because of their urgent need for money and other conveniences attached to it. Itinerant buyers exert market power against farmers who often do not have another outlet for their product. This power is also rooted in the inability of farmers to measure product quality at the farm gate, previous arrangements for credit and the tendency of itinerant buyers to demand a discount based simply upon the lack of other willing buyers. Farmers lose potential income when they sell cocoa to itinerant buyers due to receiving significantly lower farm gate prices. Most cocoa merchants are either licensed or not, but they enjoy good patronage by farmers because of the similar mode of operation like the itinerant buyers. Among other factors that informed the choice of a market outlet by cocoa farmers were good price negotiation and mode of payment.

#### Sources of labour and fund

Results in Table 2 revealed that 51.7% and 46.7% of the participant farmers and control group used hired labour on their

**Table 1.** Distribution of respondents' socio-economic characteristics

Socio-economic characteristics	Participants (n=120)		Non-participants (n=120)	
	%	Mean	%	Mean
Age (years)				
30-39	6.7		5.8	
40-49	20.8		19.2	
50-59	26.7	57.1	30.0	56.8
60-69	28.3		30.8	
70 and above	17.5		14.2	
Sex				
Male	75.8		70.0	
Female	24.2		30.0	
Marital status				
Single	0.8		-	
Married	94.2		86.7	
Widow	12.5		11.7	
Divorced	0.8		1.7	
Educational level				
No formal education	29.2		34.2	
Primary school attempted	26.7		30.0	
Primary school completed	12.5		12.5	
Secondary school attempted	7.5		7.5	
Secondary school completed	10.8		9.1	
OND/NCE holders	9.2		4.2	
HND/ First Degree holders	4.2		2.5	
Higher Degrees (PG.D /M.Sc. /Ph.D)	0.0		0.0	
Household size (number)				
1-5	65.0	5	79.2	4
6-10	35.0		20.8	
Age of cocoa plantation (years)				
0-9	0.8		-	
10-19	4.2		5.0	
20-29	44.2	32.0	45.0	31.7
30-39	25.0		25.8	
40-49	18.3		17.5	
50-59	5.8		4.2	
60 and above	1.7		2.5	
Cocoa farming experience (years)				
0-9	0.8		0.0	
10-19	28.4	23.7	33.3	22.9
20-29	50.8		51.7	
30-39	15.0		12.5	
40-49	5.0		2.5	



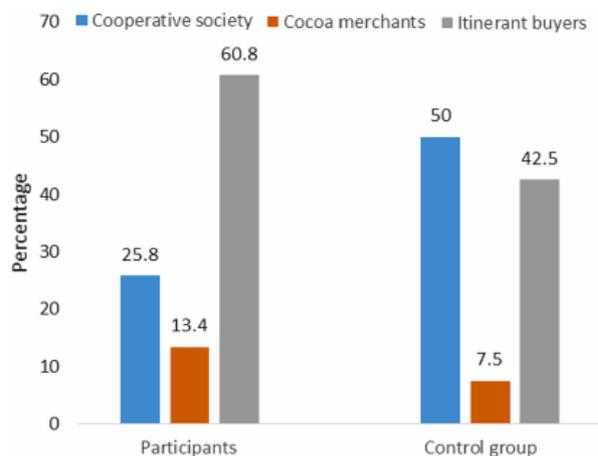
**Figure 2.** Market outlets used by cocoa farmers for sale of cocoa beans

**Table 2.** Distribution of respondents according to sources of labour, fund and information

Sources of labour, fund and information	Participants (n=120), %	Non-participants (n=120), %
Sources of labour		
Hired labour	51.7	46.7
Family labour	28.3	40.0
Communal labour	20.0	13.3
Sources of fund		
Personal saving	82.5	80.0
Loan from friends/relatives	3.3	4.2
Loan from cooperative society	5.0	5.8
Loan from money lender	9.2	10.0
Loan from Bank	0.0	0.0

cocoa farms. The implication of farmers using hired labour in cocoa farms for farming activities sometimes could be dangerous due to shortage of manpower at the time of need. This could result in delaying or abandoning some vital operations (such as weeding and harvesting) in cocoa farms and this could have a negative impact on productivity and quality of produce.

Majority (82.5% and 80.0%) of the participant farmers and control groups financed their farm projects through personal savings, respectively. This finding is in agreement with the findings of Adebisi (2008) and Nkang *et al.*, (2009). In their findings, they observed that majority of cocoa farmers in Cross River State and Oyo State of Nigeria funded their cocoa production from their personal savings. Financing cocoa farms through personal savings may limit the farmers' farm-size under cultivation. This is evident in the size of cocoa farms cultivated by the farmers in the zone. Also, financing cocoa farms through personal saving could also hinder adoption of improved cocoa technologies. Any technologies beyond the financial capability of the farmers could lead to rejection. Interaction with the respondents during the focus group discussion in Ondo state and Ekiti revealed that, lack of collateral security, fear of high interest rate, bureaucratic bottleneck and processing were major constraints to credit access among cocoa farming households. The few that got loans from money lenders complained of problems of time lag in disbursement, inadequacy of credit and high interest rate.

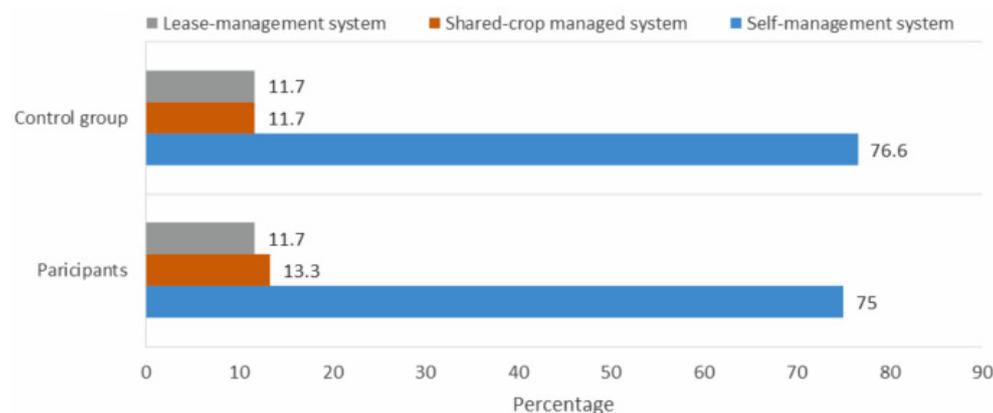
**Figure 3.** Cocoa varieties grown

### Cocoa varieties grown

Figure 3 showed that majority (60.8%) of the participants farmers planted both local and improved varieties on their farms, while 42.5% of the control group planted both improved and local varieties. This shows that farmers are gradually trying to do away with the local variety on their farms. The result further revealed that, farmers have planted improved cocoa seedlings solely on their farms.

### Management systems adopted in cocoa farm

Results in Figure 4 revealed the management systems adopted by the respondents in their cocoa farms. Majority (75.0% and 76.7%) of both the participant farmers and control group adopted self-management system (i.e. they manage their cocoa farms by themselves). This implies that, both group of farmers adopted the same farm management system. Therefore, decision taking on how to improve the cocoa farms is the sole responsibility of the owners. Also, the farmers do not need to bother about incurring some other production cost like rentage cost and loyalty annually. Some of these costs can be burdensome for farmers as they could reduce their take home income and so affect their livelihood and reduce their commitment to the welfare of their families.

**Figure 4.** Management systems adopted on cocoa farm

## Impact of cocoa resuscitation programme on farmers' livelihoods

### Impact on farmers' yield and income

#### Average farm size

Results in Table 3 revealed the average farm sizes of participant and non-participant farmers in cocoa resuscitation programme. Before the commencement of cocoa resuscitation programme in the year 2009, the average farm sizes for participating and non-participating farmers were 2.54 and 2.58 hectares respectively, indicating that there was no significant differences ( $t = -0.226$ ;  $p \leq 0.05$ ) between the average farm sizes. Ten years after the commencement of the cocoa resuscitation programme in 2009, the average farm sizes were 2.83 and 2.63 hectares, respectively. These findings show that the cocoa farmers in the study area are small scale holders. These findings agree with the findings of Agboola (2005), Amos (2007) and Adeogun (2008). In their studies, they found out that cocoa farmers are small scale holders in Ondo and Osun states of Nigeria.

#### Average cocoa beans output (kg)

A standardized cocoa bag weighs 64 kg; however, only 62.5 kg of cocoa beans are found in a bag. The remaining 2.5 kg accounted for the weight of the jute bag. Hence, 62.5 kg of cocoa constituted a bag. The results in Table 3 revealed that, the average cocoa bean output of the participant and non-participants cocoa farmers (control group) before the commencement of the resuscitation programme in the year 2009 were 579.17 kg (9.2 bags), and 583.85 kg (9.34 bags), respectively. After the programme in 2009, the average cocoa output were 667.70 kg (10.68 bags) and 575.52 kg (9.21 bags), respectively. There were increases in cocoa output between the two groups of farmers after the programme in the year 2009

The T-test result revealed that there was no significant differences ( $t = -0.114$ ;  $p \leq 0.05$ ) in the yield in 1999 between the two group of farmers, but a significant difference ( $t = 2.021$ ;  $p \leq 0.05$ ) between the mean yields of participants and non-participants cocoa farmers after the commencement of the programme. This implies that the average cocoa beans yield obtained from those three groups of farmers that benefitted from the intervention programme was higher than average cocoa beans yields of the control group of cocoa farmers. During the focus group discussion with the farmers, the participant farmers reported that, some of the programmes they benefitted from the intervention programme included free distribution of cocoa hybrid seedlings, distribution of insecticides and pesticides, fungicides at a subsidized rate, access to information on innovations in cocoa production/management and free training on pre-planting, planting and post planting cocoa operations.

It is therefore possible to conclude that the cocoa resuscitation programmes had made an appreciable impact on cocoa output of those that benefitted from the intervention.

#### Yield per hectare (kg)

Yield per hectare is the average cocoa output divided by farm size. Results in Table 3 revealed that the average yield per hectare for the participants and non-participants was 254.72 kg and 250.21 kg, respectively, while the yield per hectare after the

commencement of the programme in 2009 was 256.52 kg and 245.90 kg, respectively. There were increases in cocoa yield per hectare after the commencement of programme for the participant cocoa farmers, but a decrease in average cocoa yield per hectare for the control group was noticed. This is in contrast with some Africa countries cocoa production per hectare. According to Wessel and Quist-Wessel (2015), the average yield of cocoa in Cameroon is 300-400 kg per ha. In Nigeria and Ghana, the average yield is about 400 kg per ha. Yield improvement is constrained by the age of the farmers, a lack of proper farm management, low farm input use, inadequate supply and high costs of recommended chemicals, poor access roads to the major cocoa production areas and an inadequate extension service. The results using T-test further revealed that there was no significant difference ( $t = 0.783$ ;  $p \leq 0.05$ ) in mean yields per hectare of the participants and non-participants cocoa farmers after the commencement of the intervention programme.

#### Total variable cost

Total variable costs (TVC) are the cost incurred by cocoa farmers per annum, in land preparation, labour, fungicides, insecticides, and herbicides among others. The TVC per annum for participants and non-participants before the cocoa resuscitation programme in 2009 was N22821.67 and N22898.67, respectively. The results of T-test revealed that there was no significant difference ( $t = -0.061$ ;  $p \leq 0.05$ ) in the average variable cost for the two groups of cocoa farmers. This implies that, both spent the same amount before the commencement of the cocoa resuscitation programme. Ten years after the commencement of the programme, the TVC per annum were N42470.83 and N34012.50, respectively. The results of T-test further revealed that there was a significant difference ( $t = 3.625$ ;  $p \leq 0.05$ ) in the TVC of the participant and non-participant farmers in 2009. The TVC for the participant farmers increased significantly. This implies that the cost of production increases with time. This could be because of the additional cost involved on the part of the participants for the intervention programme.

#### Average revenue

Average revenue is the total revenue derived from the sales of cocoa products. Result in Table 3 revealed that the average revenue for participant and non-participant cocoa farmers before the commencement of the intervention programme was N99383.33, and N98129.17, respectively. The T-test results revealed that there was no significant difference ( $t = 0.178$ ;  $p \leq 0.05$ ) in the average revenue of participant and non-participant cocoa farmers before the commencement of the programme in 1999. This implies that, though the revenue of both differ but they are not statistically different. After the commencement of the programme in 2009, the revenue for participants and non-participant cocoa farmers were N271450.00, and N216058.33, respectively. The T-test revealed that there was significant difference ( $t = 3.106$ ;  $p \leq 0.05$ ) in the average revenue for the participant and non-participant cocoa farmers after the cocoa resuscitation programme in 2009.

#### Gross margin

Gross margin (GM) is the total revenue less total variable cost. Result in Table 3 revealed the GM per annum for participant and non-participant cocoa farmers before the commencement of the

**Table 3.** Impact of cocoa resuscitation programme on farmers' yield and income

	Before cocoa resuscitation programme (2009)			After cocoa resuscitation programme (2009)		
	Participants	Non-participants	T-value	Participants	Non-participants	T-value
Average farm size (ha)	2.54	2.58	-0.226	2.83	2.63	0.986
Output/yield (kg)	579.17 (9.27)	583.85 (9.34)	-0.114	667.70 (10.68)	575.52 (9.21)	2.021*
Yield per hectare	254.72	250.21	0.316	256.52	245.90	0.783
Price of per bag (Naira)	10750.00	10560.42	1.358	25600.00	23821.67	10.262*
Total variable cost per annum (Naira)	22821.67	22898.67	-0.061	42470.83	34012.50	3.625*
Average revenue per annum (Naira)	99383.33	98129.17	0.178	271450.00	216058.33	3.106*
Gross margin per annum (Naira)	76561.67	75230.50	0.184	228979.17	182045.83	2.682*
Return on investment per ha (GM/TVC)	4.30	4.39	-0.151	7.78	6.32	1.587

intervention programme was N76561.67, and N75230.50, respectively. The T-test results revealed that there was no significant difference ( $t = 0.184$ ;  $p \leq 0.05$ ) in the GM of participant and non-participant cocoa farmers. This implies that, though the gross margin for both differs but they are not statistically different. After the commencement of the programme in 2009, the gross margin for participants and non-participant cocoa farmers was N228979.17, and N182045.83, respectively. The T-test revealed that there was significant difference ( $t = 2.682$ ;  $p \leq 0.05$ ) in the average gross margin for the participant and non-participant cocoa farmers after the cocoa resuscitation programme in 2009.

#### Return on investment

Return on investment (RI) is the ratio of the gross margin to the total variable cost (TVC). It is also the ratio of benefits to costs, an indication of the return that the cocoa farmers are getting from its investment on cocoa resuscitation programme. Return on investment for the participant and non-participant cocoa farmers before the commencement of cocoa resuscitation programme in 1999 were 4.30 and 4.39, respectively. However, after the commencement of the programme, the returns on investment were 7.78 and 6.32, respectively. In other words, to every N1 spent on cocoa production in 1999 by the participant and control group were N4.30, and N4.39, respectively, were realized as gain. However, after the programme, to every N1 spent on

cocoa production by participant and control group were, N7.78 and N6.32, respectively, were realized as gain. This therefore shows that participating in cocoa resuscitation programme was cost effective and more profitable than not participating in it.

#### Impact on farmers' physical materials

##### Changes in degree of access to modern farm inputs, knowledge of cocoa production and rating of standard of living

Results in Table 4 revealed the changes in participants and non-participants before and after cocoa resuscitation programme. Greater proportion of participating (51.7%) and non-participating (53.3%) farmers had no easy access to modern farm inputs and seedlings before the commencement of the cocoa resuscitation programme. In 2009, about 78% of participating farmers and 4% of non-participating farmers had very easy access to modern farm tools and seedlings. This implies that the higher proportion that had very easy access was because of participating in the programme of which cocoa seedlings were distributed free to them. The results in Table 4 further revealed that more than half (54.2%) of the participating farmers find it easy to sell their cocoa products after participating in cocoa resuscitation programme as comparing to only 10.0% of non-participating farmers. The proportion of participating farmers that considered

**Table 4.** Distribution of respondents based on the degree of access to modern farm inputs, knowledge of cocoa production and marketing and rating of standard of living

	Participants		Non-participants	
	Before (1999)	After (2009)	Before (1999)	After (2009)
Degree of access to modern farm inputs and seedling				
No easy access	51.7	8.3	53.3	15.0
Easy accessibility	47.5	14.2	45.8	80.8
Very easy accessibility	0.8	77.5	0.8	4.2
Degree of ease of marketing cocoa product				
Difficult	36.7	20.8	31.7	27.5
Easy	54.2	25.0	65.0	62.5
Very easy	9.2	54.2	3.3	10.0
Knowledge of cocoa production and marketing				
Poor knowledge	23.3	-	44.2	50.0
Fair knowledge	67.5	39.2	50.0	42.5
Adequate knowledge	9.2	60.8	5.8	7.5
Rating in term of standard of living in the community				
As good as others	68.3	70.8	66.6	56.7
Better than others	4.2	20.0	4.2	5.0
No difference	27.5	9.2	29.2	38.3

Table 5. Distribution of respondents based on the types of houses, toilet facility and sources of drinking water

	Participants		Non-participants	
	Before (1999)	After (2009)	Before (1999)	After (2009)
Types of house				
Thatched mud house	11.7	7.5	20.0	20.0
Mud house with corrugated iron sheets	55.8	39.2	75.0	70.8
Concrete house with corrugated iron sheets	32.5	48.3	5.0	6.7
Concrete house with alumaco sheets	-	5.0	-	2.5
Type of toilet facility				
Pit toilet	75.8	68.3	75.8	37.5
Bush system	23.3	0.8	24.2	60.8
Water closet	0.8	30.9	-	1.7
Source of drinking water				
Rain water	4.2	2.5	10.0	4.2
Stream	23.3	8.3	20.0	19.2
Dug well	58.4	45.0	55.0	55.0
Bore hole	0.8	31.7	0.8	9.2
Pipe borne water	13.3	12.5	14.2	12.5

Table 6. Distribution of respondents based on physical assets possessed by the respondents

Physical assets	Participants		Non-participants	
	Before (1999)	After (2009)	Before (1999)	After (2009)
Knapsack sprayers	73.3	100.0	71.7	80.0
Car	5.8	17.5	5.0	11.7
Motorcycle	33.3	45.0	30.0	37.5
Bicycle	23.3	41.7	20.8	38.3
Radio	75.5	90.8	69.2	72.5
Television	45.8	77.5	28.3	45.0
Wall clock	80.0	83.0	79.2	83.3
Furnished wooden bed	37.0	52.0	34.2	45.0
Furnished chair (set)	6.0	18.0	6.0	12.5
Refrigerator	26.7	37.5	2.5	6.7
Grinding machine	6.0	18.0	1.7	5.8
Kerosene stove	4.0	16.0	5.0	10.0

themselves with adequate knowledge on cocoa production and marketing increased from 9.2 to 54.2 after the cocoa resuscitation programme as compared to the non-participating farmers (5.8% to 7.5%). This could be because of the constant training on cocoa production to participating farmers. Results in Table 4 showed that both participating (4.2%) and non-participating (4.2%) farmers rated themselves as better than others in terms of standard of living as compared to others in the community before the commencement of cocoa resuscitation programme in 1999. The proportion of participating farmers that rated themselves as better than others in terms of standard of living comparing to others in the community increased to about 20% compared to about 5% of non-participating farmers. This implies that participating in cocoa resuscitation programme increased the farmers' perceived standard of living.

#### Changes in types of house, toilet facility and sources of drinking water

Results in Table 5 revealed that majority of participating (55.8%) and non-participating (75.0%) farmers had mud house with corrugated iron sheets before the resuscitation programme in 1999, while in 2009, majority (48.3%) of the participating farmers had concrete houses with corrugated iron sheets. Only 6.7% of the non-participating farmers had concrete houses with

corrugated iron sheets. This represents an improvement in the type of houses owned by both group of farmers with a greater improvement in participating farmers. This could be because of the proceeds from the revenue from participating farmers. There was also an improvement in the type of toilet facility of the respondents as indicated in Table 5. After cocoa resuscitation programme, the number of participating farmers using water closet increased from 0.8% to 30.9% while that of non-participating farmers increased to 1.7%. This implies that the number of person using modern toilet for participating farmers is greater than non-participating farmers.

The result of the sources of drinking water of the respondents indicated that the higher proportion of the both participating (58.4%) and non-participating (45.0%) farmers used dug well before the cocoa resuscitation programme while after the programme in 2009, the number of dug well used was reduced. Greater proportion (31.7% and 9.2%) of the participating and non-participating farmers used bore hole as sources of drinking water. Meanwhile, the proportion of the participating farmers using bore hole as drinking water was more than that of non-participating farmers, while the number of farmers depending on pipe borne water was reduced. This could be because of non-functional of the government water supply.

### Changes in physical assets possessed by the respondents

Results in Table 6 revealed that the proportion of the participants that owned knapsack sprayers increased from 73.3% to 100.0% while that of non-participants increased from 71.7% to 80.0%. The increase in the proportion of persons that owned knapsack sprayers after the cocoa resuscitation programme is greater than non-participating farmers. The results further showed that the proportion of participants that possessed car (17.5%), motorcycle (45.0%), bicycle (41.7%), radio (90.8%), television (77.5%), wall clock (83.0%), furnished wooden bed (52.0%), furnished chair set (18.0%), refrigerator (37.5%), grinding machine (18.0%) and kerosene stove (16.0%) after the cocoa resuscitation programme is greater than the number of non-participants that possessed car (11.7%), motorcycle (37.5%), bicycle (38.3%), radio (72.5%), television (45.0%), wall clock (83.3%), furnished wooden bed (45.0%), furnished chair set (18.0%), refrigerator (6.7%), grinding machine (5.8%) and kerosene stove (10.0%) after the cocoa resuscitation programme. This implies that, though both participants and non-participant increased their physical asset possessed after, the proportion of the participants that possessed the assets is greater than the non-participants. This could be because of the increased in total revenue of the participants.

### Conclusion and recommendation

This study evaluates the cocoa resuscitation programme in South West, Nigeria. Results revealed that intervention of government in cocoa resuscitation had led to increase in the average yield of cocoa beans produced, farm input and materials possessed. The programmes also led to increase in gross revenue, gross margin accruable to the participating farmers and number of farm tools purchased. The programme had made an appreciable impact, hence had improved farmer's livelihood. The study recommended that the programme should be scale up to involved more cocoa farmers and sustain cocoa production. This could be achieved by establishing special trust fund for cocoa development in cocoa producing state by both state and federal government of Nigeria.

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