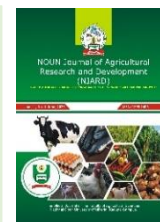




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Original Article

Assessment of Variability in the Adoption of Cocoa Technologies among Farmers in Ekiti and Ondo States, Nigeria.

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Abstract

A critical path to the deployment of scarce extension services resources for agricultural development is the identification and targeting of farmers who need such services. There is dearth of data on farmers socio-economic groups response to available technologies in the cocoa industry. This study therefore explored the variability in adoption of improved management practices among cocoa farmers in Ekiti and Ondo States, both in the southwest region of Nigeria. Data were collected from 391 farmers (170 from Ekiti and 221 from Ondo) and analysed using frequency tables, Anova and Cochran Q-test. Result on socio-economic characteristics of cocoa farmers in the study area revealed that the average age was 45 years, majority were male (74.94%) and married (84.14%). The average family size stood at 5 people, those with formal education constituted 84.14%, the average farming experience was 18 years the average farm size was 3.85ha while the average annual income was ₦853,900.26. The Cochran Q-test result ($\chi^2 = 1103$; $p \leq 0.01$) revealed significant variability in cocoa technologies adopted by the farmers with the most significant being insecticides and fungicides (0.86) and regular weeding (0.84) while the least significant were solar drier (0.24) and fencing cocoa nursery with wire mesh (0.54). T-test and ANOVA results revealed significant ($p < 0.01$) variability in adoption behaviour across the following socio-economic characteristics: sex ($t = 2.1$), age ($F = 4.00$) and education ($F = 5.73$). The need to target extension services at farmers of different socio-economic characteristic level was emphasized.

Keywords: Innovation adoption, Cocoa, variability, Ekiti, Ondo, Nigeria.

INTRODUCTION

Permanent crops constitute a significant part of the agricultural sector especially cocoa, coffee, oil palm, and rubber. For many decades, these crops were the principal export crops in Africa, and in Nigeria in particular (Ogunsola *et al.*, 2020). Cocoa is a major non-oil foreign exchange earner in Nigeria with over 98% of the product exported. Nigeria is one of the principal producers of cocoa in the world (accounting

for about 5% of the world output) coming fourth in the continent, after Côte d'Ivoire who produce about 41% of world output, Ghana who accounts for 17%, and Cameroun who accounts for about 5% (Uwagboe and Agbongiarhuoyi, 2020; Yusuf *et al.*, 2024).

Nigeria has over 300,000 small-holder farmers engaged in cocoa production, producing over 250,000tons of cocoa per year from approximately 1.4 million hectares. According to Adeleye (2024),



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this makes the crop highly essential to the Nigeria economy and a major export earner. Cocoa production remains critical source of livelihood across 14 states where it is produced including Ondo, Cross River, Oyo, Osun, Akwa Ibom, Ogun, Delta, Ekiti, Abia, Kogi, Edo, Imo, Taraba, and Bayelsa. (Akinagbe, 2018). Over 50% of this production is from Ondo State alone with substantial quantities produced in Oyo, Ekiti and Osun States (Adeyeye, 2012). In fact, Western Nigeria remains the predominant cocoa zone, accounting for more than 70% Yusuf *et al.* (2024) or 94% of Nigeria total output (Afolayan, 2020).

Furthermore, Awoyemi and Aderinoye (2019) noted that the crop is a source of livelihood for millions of households in the country and in Ekiti and Ondo States in particular, where it serves as the principal cash crop, provides essential raw materials for industries, and generates revenue for the government (Odegbade, Onemolease and Osifo, 2018; Ogunsola *et al.*, 2020). For these benefits to be fully realized, productivity-boosting technologies must be developed and adopted by the end users i.e., farmers. The Cocoa Research Institute of Nigeria (CRIN) has developed several technologies to this effect. Despite government initiatives to enhance cocoa production - such as developing and promoting improved varieties - productivity continues to decline (CRIN, 2021). FAOSTAT (2024) data indicates a steady decline in cocoa yield by 25.7% between 1991 to 2022, from 3,691 to 2,743 tons, respectively. This decline suggests that farmers are yet to embrace or implement recommended management practices (CRIN, 2021), which aligned with Johnson *et al.* (2025) report that farmers were reluctant to adopt the available technologies. This raises serious concerns about their adoption behaviour. Even when technologies are adopted, the desired changes in productivity may remain elusive if the adoption rate is skewed (Oluyole *et al.*, 2011). Skewedness or variability in technology adoption, reflects a situation in which farmers of same socio-economic characteristic such as sex (i.e., male and female) respond differently, in terms of adoption, to technologies disseminated (Adeeko, 2014). The transformation expected in the cocoa sub-sector has been slow to realize, not just because farmers have not responded to the recommended production packages but because their adoption behaviour has been skewed. Thus, any efforts to boost cocoa productivity in the country must be based on

understanding the adoption intensity as well as adoption variability among farmers. This requires insight into the uptake of cocoa technologies by farmers of different socio-economic groupings. It is both the variability in adoption response to the various cocoa technologies by the farmers and within the farmers (i.e., variability based on socio-economic cadre) that will aid a better understanding of how the government and other stakeholders can respond to the present situation regarding the farmers' adoption response.

Studies on cocoa have examined various aspects of cocoa production. Available studies have focused on the adoption of cocoa technologies by farmers (Awoyemi and Aderinoye-Abdulwahab, 2019), the constraints to technology adoption among farmers (Nmadu *et al.*, 2015), the cost and benefit analysis of cocoa farming (Oladoyin and Aturamu, 2022), and cocoa production patterns (Afolayan, 2020). Most of these studies were implemented in the southwestern part of Nigeria, an area considered to be the cocoa growing belt of the country, such as Ondo, Ekiti, Osun and Oyo States. However, these studies fell short of examining the adoption variability among the different socio-economic categories of farmers. Furthermore, studies on cocoa technology adoption failed to determine the significance of the variability in adopted technologies. This study sought to bridge these research gaps by providing evidence-based data in this regard.

Objectives of the Study

The overall objective of the study was to assess the variability in technology adoption among cocoa farmers in Ondo and Ekiti states in Southwest Nigeria. The specific objectives were to:

- a. examine the socio-economic profile of cocoa farmers in the study area.
- b. determine the variability associated with the adoption of improved technologies among the farmers in the study areas.
- c. determine the variability in adoption of cocoa technologies across the different socio-economic profile of the farmers.

The following null hypotheses were tested in the study:

- H₀₁** – There are no significant variability (differences) in the cocoa technologies adopted by farmers in the study area.



Ho₂ – The variability in technology adoption is not significantly different within farmers' socio-economic groupings in the study area.

METHODOLOGY

The study was carried in Ondo and Ekiti States, both of which lie within the southwest region of Nigeria. These States were targeted because they are major cocoa growing areas (Oladoyin and Aturamu, 2022; Awoyemi and Aderinoye-Abudulwahab, 2019). Ekiti State has a land area of 5887.8km² and is situated within Latitudes 7°25' and 8°5'N and Longitude 4°45' and 5°46' East of the equator. About 4,292,768 persons are estimated to reside within the borders of the State in 2025, based on its annual population growth rate of 3.11% and its 2006 formal census figure of 2,398,957 (NPC, 2010). Ondo State population is projected to grow from 3,460,877, in 2006 to 6,079,873 in 2025, based on its 3.01% annual growth rate (NPC, 2010). The geographical coordinate for Ondo State is between Latitude 5°45' and 8°15' North of the equator and Longitude 4°30' and 6°0' East of the Greenwich meridian. Both States are agrarian, and cocoa constitutes the dominant cash crop.

Primary data were used for this study, sourced from a cross-sectional survey of cocoa farmers in the study area. The data were collected by means of validated questionnaire and structured interview schedule for the lettered and non-lettered farmers, respectively. The reliability of the instrument was ascertained on cocoa farmers outside the sampled communities using test-retest assessment. The results ($r=0.87$) indicated that the instrument could be relied upon, being greater than the benchmark of 0.70 (Setyaedhi, 2024).

The sampling frame was based on 407,141 registered cocoa farmers in both States (Ondo = 234,184 and Ekiti = 172,957) (Ministry of Natural Resources, Ondo State, 2016 ; and Ministry of Agriculture, Ekiti State 2023). A multi-stage sampling approach was adopted in the study. The first step was the purposive selection of three local governments in each State know for cocoa production. The identified local governments were Irepodun-Ifelodun, Oye, and Ise/Orun LGAs in Ekiti State while Oke-igbo/Ile-

oluji, Idanre and Ondo East LGAs were selected in Ondo State.

The next step involved the purposive selection of three communities from the selected LGAs. These are communities well known for cocoa production . Overall, 19 communities were selected, based on the prevalence of cocoa cultivation (see details below). The last step was characterized by the random selection of farmers in each community. To determine the adequate sample size based on the study population, the sample Table of Proportion was consulted, which recommended a sample size of 400. Subsequently, proportionate random sampling was used to select cocoa farmers from each community (see details below). The data collected from the target respondents was analysed by SPSS version 25. Only 391 feedback (questionnaire) were finally received and found useful for data analysis. The data were described using frequency tables and percentages, while Cochran test, T-test and ANOVA were deployed in testing the hypotheses of the study.

Cochran Q-test is a non-parametric test used to determine if there are significant differences in the proportion of a dichotomous dependent variable (i.e., binary response) between three or more related groups (Aslam, 2023). In this study, it was used to determine if significant differences existed among the cocoa technologies adopted by farmers. ANOVA was used to compare significant differences in means across three or more groups. In this study, it was used to ascertain the significant differences in the average number of cocoa technologies adopted across farmers' socio-economic groupings such as age, education, experience, income. T-test was used to test for the significance in average technologies adopted by dichotomous socio-economic variables of the farmers such as sex, education, family size, income, farm size and farming experience.

Measurement of Variables

Adoption of Technology: This was measured as 'Yes' for those who adopted and No for those who did not adopt or discontinued adoption. The adoption score was the summation of the technologies adopted by a farmer.

Adoption Variability: This is the variation in the average number of cocoa technologies adopted across famers' socio- economic characteristic categories.



Table 1: Sampling frame of study

State	LGA	Communities	Population of farmers (N)	Sample (n)
Ekiti	Ise/Orun	Aba Panu	22,430	22
		Oko Oyo	18,302	18
		Ajebamidele	20,540	20
	Oye	Oye	19,112	19
		Ayegbaju	16,335	16
		Ire-Ekiti	21,530	21
	Irepodun-Ifelodun	Iyin	14,401	14
		Igbemo	18,234	18
		Igede	22,100	22
		Sub-Total		172,956
Ondo	Ondo-East	Owena Bridge	24,919	25
		Ago-Elesin	25,540	25
		Bolorunduro	24,299	24
	Idanre	Apefon	23,254	23
		AponmuIdanre	22,401	22
		Tejugbola	21,530	21
	Oke-Igbo	Ajowa	34,396	33
		Orisunmbare	29,030	29
		Bankemo	28,815	28
		Sub Total		234,184
	Grand Total		407,140	400

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

The socio-economic characteristics of the sampled cocoa farmers in the study area are presented in this section. The analysis is based on the 391 responses obtained from the 400 administered data instruments.

The socio-economic characteristics of cocoa farmers in the study area is depicted in Table 2. The distribution of farmers based on sex as shown in Table 2, revealed the dominance of male (74.94%) in cocoa cultivation in the study area. This is in line with the Ilesanmi and Afolabi (2020) findings that it is men that are largely engaged in cash crop cultivation in most parts of Africa, while women play supportive roles to their husband in post-harvesting handling, including fermentation and drying. The cocoa farmers were largely literate with 30.18% of them having primary schooling, 26.34% having secondary education and 27.62% with tertiary education. The high literacy can promote farmers adoption of improved technologies as it enhances their understanding, predispose them to utilize such practices (Kwawu et al., 2021; Johnson et al., 2025).

Majority of the respondents were members of Cocoa cooperative society (72.38%), potentially

exposing them to benefits associated which such membership confers such as social learning, produce aggregation and sales (Odegbade, Onemolease and Osifo, 2018). The modal age distribution was 40-49 years (33.76%) with the mean age being 45 years, suggesting the farmers were relatively within the active age group. However, it indicates that relatively older persons were involve in cocoa production with about a third of the respondents (33%) over 50 years old. This suggests a decline in the youths' participation in cocoa production.

The modal family sizes of the respondents were 1-4 (46.55%) and 5-8 (46.04%), with the average being 5. Family labour is an important resource in farming (Onemolease and Akioya, 2020), and it is expected that families with larger households have access to labour and will readily adopt improved cocoa farming practices (Omoare et al., 2016). The modal farm size was 2.0-5.9ha (48.85%) with the average respondent cultivating 3.9ha, suggesting many operate at small-scale level being less than 5ha (Onemolease et al., 2025, citing WCF, 2014). This figure exceeds the 3ha reported by Aneani et al. (2012) in Ghana and the 2.5ha reported for Nigeria by Adeleye (2024). Operating on small-scale may constrain farmers from adopting an extension package that requires large scale farming (Okiedo-Okojie and Onemolease, 2005; Job et al., 2015).



The respondents had substantive experience cultivating cocoa with about 50% having 10–30 years’ experience and a mean of 18 years. Farmers with longer experience have better appreciation of production challenges (Adesomoju *et al.*, 2024) and are therefore likely to take advantage of recommended technologies they believe can address their farm challenges (Osarenren *et al.*, 2016). Most respondents earned N500,000 -

1,000,000 (36.31%) while the mean annual income was ₦853,900.26, a figure higher than figures reported by Odegbade (2017) (₦453,249.34) and Adebisi and Okunlola (2013) (₦614,460.45) for cocoa farmers in Ekiti and Osun States, respectively. Income is a critical factor in cocoa production, as higher incomes promote the farmers’ ability to adopt improved technologies (Onemolease *et al.*, 2023).

Table 2: Socio-Economic Characteristics of Respondents

Characteristics	Options	Freq (n=391)	%	Mean
Age (years)	Less than 30	30	7.67	45
	30-39	94	24.04	
	40-49	132	33.76	
	50-59	91	23.27	
	60-69	34	8.70	
	70 and over	10	2.56	
Sex	Female	98	25.06	
	Male	293	74.94	
Education level	No formal education	62	15.86	
	Primary education	118	30.18	
	Secondary education	103	26.34	
	Tertiary education	108	27.62	
Family size	1-4	182	46.55	5
	5-8	180	46.04	
	9-12	27	6.91	
	Above 12	2	.51	
Farm size (ha)	<2.0	134	34.27	3.9
	2.0 - 5.9	191	48.85	
	6.0 - 9.9	46	11.76	
	>=10	20	5.12	
Membership of cooperative	Non-member	108	27.62	
	Association member	283	72.38	
Experience in cocoa cultivation	1-9 years	121	30.95	18
	10-19 years	122	31.20	
	20-29 years	75	19.18	
	30-39 years	48	12.28	
	40-49 years	17	4.35	
	50 years above	8	2.05	
Income range (₦)	500,000 & below	128	32.73	853,900.26
	500001-1,000,000	142	36.31	
	1000001-1,500,000	58	14.84	
	1500001-2,000,000	40	10.23	
	above 2 million	23	5.88	

Source: Field survey, 2022

Improved cocoa technologies adopted by respondents.

Table 4 reveals the improved cocoa technologies adopted by the farmers. Under nursery practices, 76.02% of the respondents adopted transplanting of seedlings after 5 to 6 months, 77.49% adopted shade, 76.98% located nursery close to farms and

water source and about 54.22% fenced the nursery with wire mesh of one meter high. Under field establishment, 83.89% of the respondents regularly weeded their farm manually or with chemicals, 81.33% adopted shade cover for cocoa seedlings, 80.05% planted improved cocoa seedlings, 75.96% used recommended spacing of



3m*3m, 74.94% regularly pruned the farm, 74.42% adopted mulching of seedlings.

The results also show that 85.68% applied insecticides and fungicides while 82.86% adopted harvesting ripe, healthy pods regularly. For harvesting, 71.36% harvested with sharpened cleaned and disinfected hooks; 80.56% fermented their cocoa beans within 5 to 7 days and 79.8% fermented cocoa beans in heaps, while only 23.79% adopted solar driers. With respect to packaging and storage technologies, 26.24%

fumigated stores where cocoa beans were stored, 23.98% kept bagged cocoa beans away from smoke and 20.36% stored cocoa beans in clean jute bags. The high adoption recorded for improved seedlings and recommended spacing and farm chemicals (fertilizer and insecticides) aligns with the studies of Akintelu (2025), Adebayo et al. (2021) and Akintelu et al. (2019). Furthermore, Omoare et al. (2016) and Oyediran et al. (2014) revealed that cocoa farmers' adoption of recommended cultural practices have the potential to enhance yield.

Table 3: Improved technologies adopted by respondents

Cocoa technologies	Freq (n=391)	%
Nursery practices		
Transplant seedlings after 5 to 6 months	309	79.03
Provision of shade at the nursery	303	77.49
Locating nursery close to farm Sites /water source.	301	76.98
Fencing the nursery with wire mesh (1 meter high)	212	54.22
Field establishment		
Regular weeding (manually or chemicals)	328	83.89
Provide shade cover for Cocoa seedlings	318	81.33
Planting improved cocoa seedlings	313	80.05
Recommended spacing (3m*3m)	297	75.96
Regular pruning	293	74.94
Mulching of seedlings/young plants	291	74.42
Fire Tracing	275	70.33
Site for new planting should preferably under forest cover	252	64.45
Control of major insect pest		
Use of insecticides and fungicides	335	85.68
Harvest ripe, healthy pods regularly to prevent pod loses to infection	324	82.86
Harvesting		
Harvest with sharpened clean & disinfected hooks/ secateurs	279	71.36
Fermentation		
Fermentation of Cocoa beans in heaps or forwarding boxes	312	79.80
Fermentation done within 5 to 7 days	315	80.56
Drying		
Drying of harvested Cocoa beans immediately after fermentation	310	79.28
Use of solar driers	93	23.79
Packaging and storage		
Storage of Cocoa bean in clean jute bags	301	76.98
Keeping bagged cocoa beans away from smoke	287	73.40
Proper fumigation of stores where cocoa bean is stored	240	61.38

Source: Field survey, 2022

Test of differences in cocoa technologies adopted by respondents

Table 3 presents Cochran Q-test result on the significant differences in cocoa technologies adopted by the farmers. The result ($\chi^2 = 1103$; $df = 21$; $p \leq 0.01$) was significant, implying that there were significant differences in cocoa technologies adopted by farmers. Since this is significant, the alternative hypothesis is accepted, and the null hypothesis rejected.

The post-hoc test revealed that the technologies with the highest and most significant adoption by the farmers were insecticides and fungicides (0.86), regular weeding with chemicals or manually (0.84), regularly harvesting of ripe pods (0.82), shading for young cocoa seedlings (0.81), fermentation of beans done between 5 to 7 days (0.81), planting of improved cocoa seedlings (0.80), fermentation of cocoa beans in heaps (0.79), drying of harvested cocoa beans



immediately after fermentation (0.79), transplanting seedlings after 5 to 6 months (0.79) and provision of shade at the nursery (0.78). The least significantly adopted technologies was use of solar drier (0.23), followed by fencing cocoa nursery with wire mesh (0.54), fumigation of storages (0.61), siting nursery farm under forest cover (0.65) and fire tracing (0.703). This result

establishes the existence of significant variability in adoption of cocoa technologies among farmers. This simply means that some technologies were significantly more adopted than others by the farmers. High adoption rates for farm chemicals (insecticides/ fungicides) and spacing have been reported by Akintelu (2025) and Adebayo et al. (2021).

Table 4: Test of difference in adoption of technologies (Cochran Q-test)

Technologies	Proportion rank
Use of insecticides and fungicides	0.857 ^a
Regular weeding manually or with chemicals	0.839 ^a
Harvest ripe, healthy pods regularly to prevent pod loses to minor infection	0.829 ^a
Provide shade cover for cocoa seedlings	0.813 ^a
Fermentation done within 5 to 7 days	0.806 ^a
Planting of improved cocoa seedlings	0.801 ^a
Fermentation of cocoa beans in heaps or forwarding boxes	0.798 ^a
Drying of harvested cocoa beans immediately after fermentation	0.793 ^a
Transplant seedlings after 5 to 6 months	0.79 ^a
Provision of shade at the nursery	0.775 ^a
Locating nursery close to farm Sites /water source.	0.77 ^{ab}
Storage of Cocoa bean in clean jute bags	0.77 ^{ab}
Recommended spacing for the new varieties is of 3M x 3M	0.76 ^b
Regular pruning	0.749 ^c
Mulching of seedlings/young plants	0.744 ^c
Keeping bagged cocoa beans away from smoke	0.734 ^c
Harvesting with sharpened clean & disinfected hooks or secateurs	0.714 ^c
Fire Tracing	0.703 ^d
Site for new planting should preferably under forest cover	0.645 ^e
Proper fumigation of stores where cocoa bean is stored	0.614 ^e
Fencing the nursery with wire mesh (1 meter high)	0.542 ^f
Use of solar driers	0.238 ^g

$\chi^2 = 1103; df = 21; p < 0.01$

Source: Computed from field survey data, 2022

Test of variability in technology adoption across socio-economic groupings.

To test for variability in technologies adopted across the farmers’ socio-economic groupings, both T-test and F-test were conducted, as presented in Table 5. The T-test result was only significant for sex ($t = 2.1; p < 0.05$), but not for cooperative membership ($t = 0.47; p > 0.05$). This implied that the number of technologies adopted by women (mean = 17) was significantly higher than their male (mean = 16) counterpart in the study area.

F test results show that only age ($F = 4.00$) and education ($F = 5.73$) were significant ($p < 0.05$), while results for family size, farm size, farming experience and income were not. The result for

age indicates significant variability (differences) exists in number of technologies adopted by farmers of different age groups. The post-hoc test shows that the least significant number of technologies was adopted by farmers that were less than 30 years old with an average of 12. Other age cadre showed variability in adoption, but these were not significantly different at the 5% probability level.

The result for educational status shows that farmers with no formal education adopted the least significant number of technologies (mean = 15), while those with tertiary education adopted the highest (mean = 18). However, no significant variability in adoption exists between farmers



with no formal education, primary (mean =16) and secondary (mean = 16) education.

The results for other farmer characteristics show there were variability in adoption of cocoa technologies across the levels, however, these were not significant ($p < 0.05$). For example, the

result for farm size indicates variability in adoption and show that farmers with more than 2ha adopted more farm technologies (mean = 17) compared to those with less than 10ha (mean = 15); however, the variability in adoption was not statistically significant ($F = 2.44$; $p > 0.05$).

Table 5: Test result for variability in adoption across socio-economic categories.

Socio-economic groups	Categories	Freq.	Adoption score (Mean)	T test value	Prob. Level
Sex*	Male	293	16	2.1	0.037
	Female	98	17		
Membership of cooperatives	Yes	283	16	0.474	0.305
	No	108	16		
				F value	
Age range (years)*	< 30	30	12 ^b	4.00	0.001
	30-39	94	15 ^a		
	≥70	10	16 ^a		
	40-49	132	16 ^a		
	50-59	91	17 ^a		
	60-69	34	18 ^a		
Education status*	No formal education	62	15 ^b	5.73	0.001
	Secondary education	103	16 ^b		
	Primary education	118	16 ^b		
	Tertiary education	108	18 ^a		
Family size	1-4	182	16	1.87	0.134
	5-8	180	17		
	9-12	27	14		
	above 12	2	19		
Farm size (ha) (range)	<2.0	134	15	2.44	0.064
	2.0 - 5.9	191	17		
	6.0 - 9.9	46	17		
	>=10	20	17		
Farm experience	1-9 years	121	16	1.39	0.227
	10-19 years	122	15		
	20-29 years	75	17		
	30-39 years	48	16		
	40-49 years	17	17		
	50 years above	8	13		
Income (₦)	<0.5M	128	11	2.2	0.07
	0.5M-1M	142	13		
	1M-1.5M	58	12		
	1.5M-2M	40	13		
	>2M	23	8		

*Significant at 5% level

Source: Computed from field survey data, 2022



CONCLUSION AND RECOMMENDATIONS

The findings of this study revealed a positive response to improved farming practices among cocoa farmers. While this is commendable, a revealing part of this work is that the farmers responded differently to these technologies based on their socio-economic range or cadre. This implied the existence of variability in the adoption of improved cocoa management practices across each socio-economic category or range. Though this was not significant across all the socio-economic characteristics of the farmers; however, significant variability in adoption was observed across sex, age and educational characteristics. For example, though women are generally described to be trailing men in adoption of improved farm technologies, the result of this study showed that in the case of cocoa technologies in the study area, it was the men who recorded lower adoption rate.

Based on the above findings, it is recommended that the relevant extension agencies such as those of the Cocoa Research Institute of Nigeria (CRIN) and the State extension services (i.e., the ADP) should intensify their outreach to male cocoa farmers to enhance their adoption behaviour. Furthermore, farmers with little or no formal education should also be targeted by the extension agencies to boost technology uptake among this group. Finally, younger farmers especially those less than 30 years, should be targeted with extension services to facilitate their adoption of cocoa technologies.

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