Contribution of Sustainable Cocoa Production to Poverty Reduction in Nigeria

.

ABSTRACT

The study examined the contribution of sustainable cocoa certification programme to poverty reduction in Nigeria. A multistage sampling procedure was used to select 360 cocoa farmers (certified and non-certified farmers) from 3 major cocoa-producing states in the country. The Alkire-Foster method of multidimensional poverty index was used along with descriptive statistics to analyze the data collected. The study revealed that the annual average cocoa income of certified farmers and non-certified farmers is ₦954,791.7 and ₦663,742.4 respectively. More than half (63%) of the cocoa farmers are multidimensionally poor and the majority (80%) of them are non-certified cocoa farmers. Therefore, policymakers should develop programme that address multidimensional poverty among cocoa farmers, such as providing access to electricity, drinking water, health care, and sanitation. In addition, more awareness should be created on cocoa certification programme to encourage more participation among cocoa farmers.

Keywords: Sustainability, Cocoa, Certification, Development, Poverty, Multidimensional

1. INTRODUCTION

Cocoa beans are the primary ingredient in chocolate, and the global chocolate industry is worth over USD 150 billion [1]. However, despite this potential of cocoa production, 70% of the world's cocoa market are produced in West Africa, and over 70 % of these producers live in rural areas faced with severe poverty and inequality [2].

Over the past few decades, cocoa production has captured the interest of stakeholders with its effects on smallholders' welfare being actively discussed [3]. Certification standards have been argued to mitigate the low yields, high poverty, and negative environmental and social outcomes of the current cocoa production practices [4].

Generally, the certification programme is a voluntary standard introduced by non-governmental organizations (NGOs) that are carried out through public-private partnerships, allowing farmers/producers to participate willingly [5]. The programme provides agricultural inputs to the farmers in a backward integration strategy, training on good agricultural practices, and as well as gives them a premium on their sold certified cocoa beans. As a result, it is expected that the possible economic benefits from this certification programme will lead to sustainable cocoa production and thereby enhance the quality of lives of cocoa farmers towards poverty reduction.

Poverty is the biggest obstacle to achieving sustainable development goals [6]. It is a major global issue and every minute a person dies due to poverty-related reasons [7]. Poverty is a global issue that has been the subject of discourse and research for many years. More than 10% of the world population still live below the international poverty line and struggling to fulfil the most basic needs like health, education, and access to water and sanitation [8]. Many of the world's poor are small-scale farmers who rely on agriculture as their primary source of food, and livelihood [9].

Many studies have been carried out globally on the cocoa certification programme, however, this study aims to provide empirical evidence to ascertain the contribution of cocoa certification programme to poverty reduction in Nigeria

2. METHODOLOGY

2.1 Study Area

The study was carried out in South-West, Nigeria. The region is the major cocoa-producing area in Nigeria [10].

Established in 1976, Ondo State is positioned within the coordinates of longitudes 4° 151' E and 6° 001' E of the Greenwich meridian, as well as latitudes 5° 451' N and 7° 451' N, situated to the north of the equator in the southwestern region of Nigeria. Encompassing an expanse of approximately 15,000 square kilometres, the state accommodates a population of 3,441,924 individuals, as recorded in the 2006 census. Agriculture serves as the cornerstone of Ondo State's economy, with its climate proving highly conducive to agrarian pursuits for its numerous residents

Osun state is endowed with both people and material resources. It is bounded by Ogun, Kwara, Oyo, Ondo, and Ekiti states in the south, north, west and east respectively. The state is situated in the tropical rainforest and it lies within latitudes 6° and 9° N of the equator and approximately between longitudes 2° and 7° E of the Greenwich meridian. With a population

of 3,423,535 according to the NPC's 2006 records, the state comprises 30 local government areas. Agriculture is undertaken at both commercial and subsistence levels. The state's primary export crop is cocoa, which holds a significant position as the second-largest cocoa producer after Ondo [11]. Other crops include yam, cocoa, and cassava.

Ogun State has a total land area of 16,409.26 square kilometres, it is bounded on the West by the Benin Republic, on the South by Lagos State and the Atlantic Ocean, on the East by Ondo State, and on the North by Oyo and Osun States. Geographically, it lies between Latitude 6.2°N and 7.8°N and Longitude 3.0°E and 5.0°E. Ogun is one of Nigeria's top cocoa-producing states. [12]. The state's vast fertile land supports the growing of both food and cash crops, including cassava, rice, cocoa, kola nuts, yam, and rubber [13].

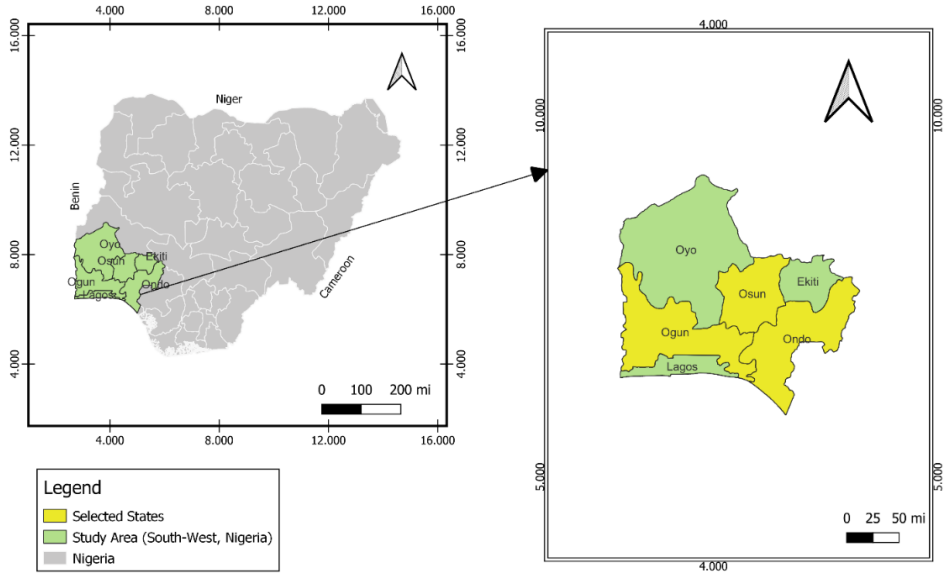

Figure 1: Map of the Study Area

2.2 Sample and Sampling Procedures

Primary data was used for this study, and this was collected through direct interviews with the use of a well-structured questionnaire.

A multi-stage sampling procedure was also employed. In the first stage, three states, namely Ondo, Ogun, and Osun, States were purposively sampled due to their high contributions to cocoa production in Nigeria, and also because of the presence of cocoa certification programme in these states. The second stage involved a purposive selection of the six Local Government Areas (LGAs) where cocoa certification programme is being implemented from the selected states. These LGAs are Ijebu North, and Ijebu East LGAs (Ogun State), Idanre and Owo LGAs (Ondo State) and Ife South and Ife East LGAs (Osun State). At third stage, two communities were randomly sampled from each of the selected (LGAs). At the final stage, 30 certified and non-certified farmers were randomly sampled from each community, thereby making a total 360 sample size.

2.3 Data Analysis

In this study, descriptive statistics and inferential statistics were used.

2.3.1 Multidimensional Poverty Index (MPI)

A multidimensional poverty index was employed to determine the poverty status of the cocoa farmers. The Alkire-Foster Method (AFM) [14] is a reliable measurement because it was developed mainly with categorical/ordinal data. The measure has lately been used to calculate MPI for several population categories [15]. The AFM complies with axioms such as dimensional monotonicity (poverty status ought to rise anytime a poor person becomes deficient in an additional dimension) and decomposability (helpful in targeting demographic subgroups) [16] [17].

Table 1: Dimensions Indicators and Weights

Dimension	Indicators	Measurement	Weight
Education	Years of schooling Children	Deprived if no household member has completed 9 years of formal education	1/6
	Child enrolment	Deprived of any school-aged child is not attending school in years 1 to 6	1/6
Standard of Living	Electricity	The household is deprived if they do not have access to electricity.	1/18
	Drinking water	The household is deprived if its main source of water is from unprotected wells, open springs, and surface water or they require more than 30 min to fetch water	1/18
	Sanitation	Deprived if they do not have improved toilet or if their toilets is shared	1/18
	Housing	Households living in a single room, house made of wood, and straws	1/18
	Cooking fuel	The household is deprived if they cook with wood, coal, straw, or dung	1/18
	Assets	Radio, TV, telephone, bike, or motorbike, and do not own a car or tractor	1/18
Health	Health care quality	Deprived if the household does not have access to quality healthcare	1/6
	Health as a limiting factor	Deprived if health is a limiting factor in most regular activities	1/6

Source: Alkire and Foster (2011)

2.3.1.1 Dimensions, indicators, and deprivation cutoffs

Ten indicators are used by the MPI, with two indicators for education, two for health, and six for standard of life, which are broken down into the three dimensions of education, health,

and standard of living. The performance of the households is determined by their scores in these categories. Table 1 lists the weights, thresholds, dimensions, indicators, and MPI-used variables in brief for additional information on the dimensions and indicators [18].

2.3.1.2 The notation

Let y= [y_{ij}] denote the (n x d) matrix of achievements, where n represents the number of cocoa farming households, d is the number of dimensions, and $y_{ij} \geq 0$ is the achievement of household i= 1, 2..., n in dimension j= 1, 2…d. Each row vector yij = yi1, yi2, y_{id} lists the household's i's achievements, while each column vector y_{ij} = y_{1j},y_{2j},….y_{nj} gives the distribution of dimension j achievements across the set of cocoa farming households. A vector z = (z_1,,z_d) of deprivation cutoffs (one for each dimension) is used to determine whether a household is deprived. If the household's achievement level in each dimension j falls short of the respective deprivation cut off zj, the household is adjudged not deprived in that dimension; if the household's level is at least as great as the deprivation cutoff, the household is not deprived in that dimension.

The maximum score is 100%; with each dimension equally weighted (thus the maximum score in each dimension is 33.3 percent). Each indicator within a dimension is also equally weighted. A cut-off of 33.3%, which is the equivalent of one-third of the weighted indicators, is used to distinguish between the poor and non-poor. This implies that if C is 33.3% or higher, that household is multi-dimensionally poor. Households with a deprivation score greater than or equal to 20% but less than 33.3% are vulnerable to or at risk of becoming multi-dimensionally poor. Households with a deprivation score of 50% or higher are severely multi-dimensionally poor. Following [19], the deprivation headcount (Ho) and the dimension-adjusted headcount (Mo) model is given as follows (equations i – iii)

Ho (X; k; Z) ≡ 1 N

∑ I (Cn ≥ k) N n=1 = q/N …….…….…. (1)

A (X; k; Z) ≡∑ I (Cn ≥k) Cn N n=1 q = ∑ c q $_1$/ q…… (2)

Mo = Ho × A.……..…..… (3)

3. RESULTS AND DISCUSSION

3.1 Socioeconomics Characteristics

3.1.1 Age

Table 2 shows the distribution of the cocoa farmers by age. The mean age of the total number of respondents, certified farmers and non-certified farmers are 47.8, 47.1 and 8.1 years respectively. This implies that the majority of cocoa farmers in the study area were within productive age that could enable them to live above the poverty line. This result supports the findings of [20] who found the mean age of cocoa farmers to be 48 years in a study carried out on determinants of farm certification compliance for sustainable cocoa production in Ondo State, Nigeria.

Table 2: Distribution of Respondents by Age

	Certified farmers		**Non-certified farmers**		**Total Sample**	
Age (years)	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
≤30	14	7.4	28	16.5	42	11.7
31-40	44	23.2	20	11.8	64	17.8
41-50	66	34.7	50	29.4	116	32.2
51-60	42	22.1	33	19.4	75	20.8
>60	24	12.6	39	22.9	63	17.5
Total	**190**	**100.0**	**170**	**100.0**	**360**	**100**
Mean	47.4		48.1		47.8	

Source: Field Survey Data, 2021

3.1.2 House Size

Table 3 shows the distribution of the cocoa farmers by household size. The mean household size of the total number of respondents, certified farmers and non-certified farmers are 5.89, 4.19 and 5.09 years respectively. Out of the 190 certified cocoa farmers, 23.7% of the households were within (1-3) household size, 43.2% of them were within (4- 6), 21.1% of them were within (7- 9), while 12.0% of the household were above 9 household size. Likewise, out of the 170 non-certified cocoa farmers, 35.9% of the households were within (1-3) household size, 53.5% of them were within (4- 6), 7.1% of them were within (7- 9), while 3.5% of the household were above 9 households.

Table 3: Distribution of Respondents by Household Size

	Certified farmers		Non-certified farmers		Total Sample	
Household Size	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percent**
1-3	45	23.7	61	35.9	106	29.4
4-6	82	43.2	91	53.5	173	48.1
7-9	40	21.1	12	7.1	52	14.4
≥10	23	12.0	6	3.5	29	8.1
Total	**190**	**100.0**	**170**	**100.0**	**360**	**100.0**
Mean	5.89		4.19		5.09	

Source: Field Survey Data, 2021

3.1.3 Annual Cocoa Income

As shown in Table, 4, the annual average cocoa income of certified farmers and non-certified farmers are ₦954,791.7 and ₦663,742.4 respectively. This implies that certified farmers earn more income from cocoa production than their non-certified counterparts. This result can be attributed to various training and opportunities derived by the certified farmers from participation in cocoa certification programme. This finding is in line with [21] in their study on Productivity and income analysis of certified cacao farmers (UTZ Certified) and non-certified cacao farmers in Indonesia, who found out that the average income per year for certified farmers is also higher than the non-certified farmers.

Table 4: Distribution of Respondents by Annual Cocoa Income

	Certified farmers		Non-certified farmers	
Annual Cocoa Income (₦ '000)	**Frequency**	**Percentage**	**Frequency**	**Percentage**
<100	6	3.2	17	10.0
101-500	44	23.2	65	38.2
501-1000	81	42.6	65	38.2
1001-1500	32	16.8	10	5.9
≥1501	27	14.2	13	7.6
Total	**190**	**100.0**	**170**	**100.0**
Mean	954,791.7		663,742.4	

Source: Field Survey Data, 2021

3.1.4 Access to Credit Facilities

Table 5 revealed that the majority (62.5%) of the total number of respondents did not have access to credit facilities. Out of the 190 certified cocoa farmers, about 60% of them did not have access to credit facilities and out of the 170 non-certified farmers, about 65% also did not have access to credit facilities. This implies that both certified and non-certified farmers have less access to credit facilities. This result is in line with the finding of [22] who found out that the majority of cocoa farmers do not have access to institutional credit, in his study on the role of access to credit in cocoa production in Nigeria.

Table 5: Distribution of Respondents by Access to Credit Facilities

	Certified farmers		Non-certified farmers		Total Sample	
Access to	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**

Credit						
Yes	75	39.5	60	35.5	135	37.5
No	115	60.5	110	64.7	225	62.5
Total	**190**	**100.0**	**170**	**100.0**	**360**	**100.**

Source: Field Survey Data, 2021

3.2 Multidimensional Poverty Status of Cocoa Farmers

Table 6 shows the estimates for the multidimensional poverty index. The multidimensional poverty index was used to determine the poverty level of cocoa farmers in the study area. The multidimensional headcount ratio for the total sample was 0.63, which implies that 63% of the cocoa farmers are multidimensionally poor. That is, 63% of the cocoa farmers live in households without electricity, no drinking water, no quality health care and no good sanitation. This finding is consistent with the findings of [23] who found a multidimensional headcount ratio of 67.4 % in southwest Nigeria. The result further revealed that the multidimensional headcount ratio for the certified farmers was 0.49, while that of non-certified farmers was 0.80. This implies that 49% and 80% of certified and non-certified cocoa farmers are multidimensionally poor respectively.

The intensity of poverty among the cocoa farmers in the study area was 0.40, which means on average, the cocoa farmers were deprived in 40% of the weighted indicators. The implication of this is that they are deprived of 40% of quality health care, good drinking water, electricity, and improved sanitation. In addition, the intensity of poverty among certified and non-certified farmers are 0.37 and 0.43 respectively. This means that 37% and 43% of the certified and non-certified households are deprived respectively.

Table 6: MPI based on participation in Certification Programme

Parameters	**Certified Farmers**	**Non-Certified Farmers**	**Total Sample**
Multidimensional Headcount (H_0)	0.49	0.80	0.63
Intensity of Poverty (A)	0.37	0.43	0.40
Multidimensional Poverty Index (M_0)	0.18	0.34	0.26

Source: Field Survey Data, 2021

3.2.1 Disaggregation of Deprivation by Participation in Certification Programme

Table 7 shows the summary of MPI's dimensions and indicators for the entire sample. The results show that cocoa farmers are most deprived of the standard of living, followed by the health dimension. Indicator-wise, cocoa farmers are the most deprived in terms of sanitation (84.2%), Electricity (71.4%) and quality of health (63.3%), while they are less deprived of assets (2.5%).

The result further reveals that non-certified households are more deprived than certified households in 7 of the 10 indicators. This implies that non-certified households suffer more deprivations than their certified counterparts. The less deprivation in the health dimension of the certified farmers when compared to non-certified farmers could be attributed to the contribution of training the certified farmers received on health and safety as well as the provision of Personal Protective Equipment (PPEs) and First Aid boxes to the farmers by their internal management system (IMS).

In addition, the less deprivation in the children's school enrollment of the certified farmers could be attributed to the awareness and the sensitization received by the certified farmers on the importance of children's school enrollment based on the certification standard, as well as the establishment of child labour monitoring and remediation system (CLRMS) among the certified cocoa farmers.

Table 7: Incidence of Deprivation across Indicators

Dimension	Certified Farmers		Non-Certified Farmers		Total Sample	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percent
Education						
Basic Education	83	43.7	12	7.1	95	26.4
Enrolment	18	9.5	18	10.6	36	10.0
Standard of Living						
Electricity	117	61.6	140	82.4	257	71.4
Drinking water	75	39.5	120	70.6	195	54.2
Sanitation	163	85.8	140	82.4	303	84.2
Housing	70	36.8	18	10.6	88	24.4
Cooking fuel	87	45.8	124	72.9	211	58.6
Assets	4	2.1	5	2.9	9	2.5
Health						
Quality Healthcare	91	47.9	138	81.2	229	63.3
Sickness	4	2.1	17	10.0	21	5.8

Source: Field Survey Data, 2021

4. CONCLUSION

Based on the study, it could be concluded that more than half of the cocoa farmers are multidimensionally poor and the majority of them are non-certified cocoa farmers. Certified cocoa farmers are less deprived in the children's school enrollment and this could be attributed to the awareness and the sensitization received by the certified farmers on the importance of children's school enrollment based on the certification standard, as well as the establishment of child labour monitoring and remediation system (CLRMS).

It is concluded that participation in the cocoa certification programme reduces poverty. Therefore, policymakers should develop programmes that address multidimensional poverty among cocoa farmers, such as providing access to electricity, drinking water, health care, and sanitation. In addition, more awareness should be created on cocoa certification programme to encourage more participation among cocoa farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist

REFERENCES

1. Van Huellen, S., and Abubakar, F. M. (2021). Why Ghana doesn't get the full value of its cocoa beans–and how this could change. *The Conversation*. Available at: https://theconversation.com/why-ghana-doesnt-get-the-full-value-of-its-cocoa-beans-and-how-this-could-change-158773. Accessed: 51 April 2023

2. Agwu, N. M., & Oteh, O. U. (2014). Analysis of income inequalities and food security among farmers in Abia State, South Eastern Nigeria. Scientific Papers Series Management. Economic Engineering in Agriculture and Rural Development, 14(3), 7-23.

3. KPMG. (2013). Improving smallholder livelihoods: Effectiveness of certification in coffee, cocoa and cotton (Issue October).

4. Fenger, N., Bosselmann, A., Asare, R., & Neergaard, A. (2017). The impact of certification on the natural and financial capitals of Ghanaian cocoa farmers. Agroecology and Sustainable Food Systems. https://doi.org/10.1080/21683565.2016.1258606

5. Barham, B. L., & Weber, J. G. (2012). The economic sustainability of certified coffee: Recent evidence from Mexico and Peru. World Development, 40(6), 1269-1279.NBS

6. Cheng, X., Shuai, C.-m., Wang, J., Li, W.-j., Shuai, J., & Liu, Y. (2018). Building a sustainable development model for China's poverty-stricken reservoir regions based on system dynamics. Journal of Cleaner Production

7. Mack E. S. Michael, K. and Stephen, P. T. (2009): Law, Ethics and Economics: Absolute Poverty and Global Justice: Empirical Data, Moral Theories, Initiatives, Ashgate Publishing Group

8. Beegle, K., & Christiaensen, L. (2019). Accelerating poverty reduction in Africa. World Bank, Washington, DC.

9. De Janvry, A., & Sadoulet, E. (2009). Agricultural growth and poverty reduction: Additional evidence. World Bank Research Observer, 25(1), 1–20

10. National Bureau of Statistics (2012), LSMS: Integrated surveys on Agriculture: General Household Survey panel 2010/11

11. Popoola O. A., Ogunsola G. O., Salman K. K. (2015): Technical Efficiency of Cocoa Production in Southwest Nigeria. International Journal of Agricultural and Food Research [IJAFR] 4: 1–14.

12. Afolayan, O. S. (2020). Cocoa production pattern in Nigeria: The missing link in regional agro-economic development. Analele Universităţii Din Oradea, Seria Geografie, 30(1), 88-96.

13. Adebayo, O. A. (2019). Group Dynamics Features and Socio-Economic Status of Cocoa Farmers in Ogun State, Nigeria. International Journal of Agricultural Management and Development, 9(2), 77-88.

14. Alkire, S. and Foster, J. 2007. Counting and multidimensional poverty measurement. OPHI Working Paper 7, 33p. University of Oxford. 33pp

15. Alkire, S., & Santos, M. E. (2010). Acute multidimensional poverty: A new index for developing countries.

16. Decancq K. and Lugo, M.A., 2008. Setting Weights in Multidimensional indices of wellbeing, OPHI Working Paper 18 University of Oxford. pp34

17. Alkire S, Roche J.M, Santos M.E. and Seth S. (2011): Multidimensional Poverty Index 2011: Brief Methodological Note Oxford Poverty and Human Development Initiative (OPHI), University of Oxford.

18. Adenuga, A. H., Omotesho, O. A., Ojehomon, V. E. T., Diagne, A., Olorunsanya, E. O., & Adenuga, O. M. (2013). Poverty analysis of rice farming households: a multidimensional approach. *Albanian Journal of Agricultural Sciences*, 12(4), 641.

19. Yalonetzky G. 2011. Conditions for the most robust poverty comparisons using the Alkire-Foster Family of Measures OPHI Working Paper 44b, University of Oxford. 22pp

20. Akinwale, J. A., Ojerinde, K. D., & Owoade, E. O. (2019). Determinants of farm certification compliance for sustainable cocoa production in Ondo State, Nigeria. *Journal of Agriculture and Environment for International Developmen*t (JAEID), 113(1), 97-112.

21. Salman, D., Summase, I., Fudjaja, L., and Tiring, D. N. (2021, March). Productivity and income analysis of certified cacao farmers (UTZ certified) and non-certified

cacao farmers. In IOP Conference Series: Earth and Environmental Science (Vol. 681, No. 1, p. 012049). IOP Publishing. https://doi:10.1088/1755-1315/681/1/012049

22. Adebayo, A. G. (2019). The Role of Access to Credit in Cocoa Production in Nigeria.

23. Amao, J. O., Ayantoye, K., & Fanifosi, G. E. (2017). An analysis of multidimensional poverty and its determinants in rural Nigeria. *Journal of Development and Agricultural Economics*, 9(11), 303-311.