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# PRODUCE CERTIFICATION AND INCOME RISK MANAGEMENT STRATEGIES OF COCOA FARMING HOUSEHOLDS IN SOUTH-WEST NIGERIA

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**Abstract:** Agricultural produce certification is synonymous to farm assurance of which cocoa certification is an example; dealing with issues of Good Agricultural, Environmental and Social Practices (GAP, GEP and GSP) in cocoa production. Essentially, GAP, GEP and GSP packages had in-built mechanism that can aid farmers mitigate factors that could lead to farm income risks in cocoa production. Consequently, this study examined the influence of cocoa certification on income risks of cocoa farming households in South-west Nigeria. A multistage sampling technique was used to select 180 cocoa farming households from whose heads data were obtained with interview schedule in Southwest Nigeria. Data were analyzed with Chi-square Statistic, Income Risk Management Diversification Index (IRD) and Mann-Whitney-U Test Statistic. Chi-square analysis shows that (52.3%) certified cocoa farming households employed more risk management strategies than (94.2%) uncertified cocoa farming households ( $p < 0.01$ ).

The Mann-Whitney-U test revealed a significant difference ( $p > 0.05$ ) between the income risk management practices of certified and uncertified cocoa farming households. Therefore, produce certification has been helping cocoa farming households in mitigating farm income risk in cocoa production through the employment of diverse (risk) management strategies. Hence, stakeholders should intensify efforts in encouraging farming households to embrace (cocoa) produce certification.

**Keywords:** cocoa, produce certification, South-west Nigeria, household, income risk.

## Introduction

Produce certification can be defined as a procedure of validating that a particular product satisfies specific requirements and ensuring that the produce meets acceptable standards for quality (EPA, 2012). According to European Union's scheme on food quality certification (EU, 2013), certification of agricultural produce ranges from compliance with required production standards and environmental protection. Cocoa certification programme ensures good agricultural, environmental and social practices (GAP, GEP and GSP) in cocoa produce production (i.e. cocoa beans production). This is to ensure sustainable cocoa production with increased productivity and produce quality as well as improved livelihood of small-holder cocoa producers. The farmers therefore benefits from a higher income based on the principle "a better price for a better product". Certification verifies that cocoa is produced in a way that is good for farmers, the environment and the industry. Certification criteria aim to go beyond existing international standards by introducing productivity measures that will ensure certification directly increases growers' incomes. The World Cocoa Foundation (WCF) supports programmes that engage West and Central African cocoa farmers, their families and communities and the institutions that impact their

wellbeing to further the economic, social and environmental sustainability of cocoa production. In order to keep up with consumer demand and avoid decline of this raw material, the Cocoa Plan Initiative (of WCF) is to essentially encourage and help farmers improve the quality and quantity of their cocoa harvests.

## Problem statement

Globally, small-holders are the main producers of cocoa and a substantial proportion of this population is in the West African countries of Nigeria, Cameroon, Ghana and Cote d'Ivoire. Nigeria has a global market share of about 6% and rank fourth after Cote d'Ivoire, Ghana and Cameroun in cocoa export (WCF, 2010; Oguntade, 2012). The growth rate of cocoa production has been declining in major producing countries, which has led to a fall in the fortunes of the sub-sector and income of around 2.5 million small-holder cocoa farming families. Cocoa business is extremely risky, leading to price speculations with consequences such as improperly dried beans as a result of unreliable and unfavorable prices which discourage farmers in investing in cocoa farms due to cocoa price volatility. This predisposes farmers to income unpredictability and instability. Consequently, the farmers

mostly suffer from income risk whereby the farmers are at the risk of earning negligible or zero income. Many (of the farmers) embark on various strategies to manage this income risk with little success due to the prevailing circumstances in which they operate such as vagaries of weather, socio-economic pressures as well as lack of awareness of improved technology and practices. Certification was evolved in order to address most of the issues predisposing cocoa farming to risks i.e. income risks the producers are experiencing.

## Justification

Cocoa certification has a number of in-built mechanisms, via its components i.e. GAP, GEP and GSP, which tremendously impact on cocoa production practices by drastically reducing (if not eliminating) the attendant challenges associated with cocoa production. For instance, if a farmer wants to establish new cocoa trees, the prevalent practice is either the farmer uses seeds from high yielding tree on own farm or that of a fellow farmer. Unfortunately, due to problems associated with inbreeding, the cocoa trees emanating from this type of propagation method may be susceptible to a number of diseases and pests leading to lower yields that reduces or wipe out farmer's income. However, under cocoa certification programme, the farmer is mandated to obtain cocoa seeds from certified suppliers such as extension agencies and research institutes. This eliminates the attendant inbreeding problems, thus leading to a good farm yield and consequently appreciable cocoa farm income. Some farmers are yet to embrace the certification scheme but usually employ several strategies in managing challenges in the production of the crop – cocoa, which is a very important crop in the economy of Nigeria.

In Nigeria, cocoa production offers a great opportunity to diversify the economy and improve the livelihoods of the producers if carried out efficiently. Prior to the 1970s, the crop was a major agricultural commodity export in the western part of Nigeria. Adegbola and Abe (1983) reported that Nigeria was rated the second largest world producer of cocoa in the 1960s and, for a long time, the crop has been generating substantial foreign exchange earnings for the country before the discovery and large scale exploration and exploitation of crude oil. This has encouraged a near neglect of the cocoa sub-sector of the Nigerian economy with attendant ills like falling quality, excessive price speculations, reduced yield (per land unit) and dwindling production. Although its contribution to the total export earnings of Nigeria during the past three decades has dropped considerably, cocoa still remains one of the major agricultural export crops in Nigeria (Osun, 2011). Statistics by ICCO (2010) puts cocoa production in Nigeria for 2009/2010 season at 260,000 tons. CRIN (2008) and Osun (2011) stated that cocoa is being produced in 14 out of 36 states in Nigeria with 70% of the production taking place in the South-western States.

Against this background, the introduction of certified cocoa development program is regarded as a tool to transform the cocoa sub-sector in Nigeria using sustainable (cocoa) production practices and supply chain approach which ensures a fair

deal amongst the key players in the value chain. The quality issue may either be stated in the trade contract or in quality certifications and the benefit of certification is usually better prices and premium prices for producers (Koekoek, 2003) as well as traceability for the industry. Therefore, this paper examined the effect of produce certification on income risk management strategies employed by cocoa farming households in South-west Nigeria.

## Methodology

### *Study Area*

This study was conducted in South-west Nigeria which is one of the three geo-political zones in Southern Nigeria. The area lies between longitude 2° 31' and 6° 00' East and Latitude 6° 21' and 8° 37' N (Agboola, 1979) with a total land area of 77,818 km<sup>2</sup> and a projected population of 28, 767, 752 in 2006 (NPC, 2006). South-west Nigeria is predominantly agrarian having notable food crops cultivated to include cassava, maize, yam and cowpea as well as cash crops such as cocoa, kolanut, coffee and oil palm. The study area is bounded in the East by Edo and Delta States, in the North by Kwara and Kogi States, in the West by the Republic of Benin and in the south by the Gulf of Guinea. The climate of South-west Nigeria is tropical in nature and is characterized by wet and dry seasons. The temperature ranges between 21°C and 34°C while the annual rainfall ranges between 150 mm and 3000 mm. The wet season is associated with the south-west monsoon wind from the Atlantic Ocean while the dry season is associated with the north-east trade wind from the Sahara desert. The vegetation in South-west Nigeria is made up of fresh water swamp and mangrove forest at the belt and low land in forest stretching inland to Ogun State and part of Ondo State while secondary forest is towards the northern boundary where derived and southern Savannah exists (Agboola, 1979). This study area was chosen because South-west Nigeria is an important cocoa producing area of Nigeria that accounts for 68.52% of cocoa hectrage and about 70% of total national cocoa production (CRIN, 2008; Oguntade, 2012).

### *Data Sources and Collection*

The data for this study were obtained through primary source with the aid of a pre-tested questionnaire in interviewing cocoa farming household heads. Data collected include socio-demographic variables such as age, sex, household size and level of education as well as (farm) production variables such as farm size, output, price per unit of inputs and output (cocoa beans) and income risk management strategies.

### *Sampling Procedure and Size*

Based on Cocoa Research Institute of Nigeria (CRIN) and National Cocoa Development Committee (NCDC) categorization of cocoa producing States and Local Government Areas (LGAs) in Nigeria into high, medium and low producers

(CRIN, 2008), 180 cocoa farming households were selected for this study using a multistage sampling technique. The first stage was purposive sampling of the high producing States category in Southwest Nigeria. The second stage involved a simple random selection of one State (Ondo) from the category. The third stage also involved a random selection of six LGAs in Ondo State. The fourth stage was a random selection of two communities from each of the selected LGAs. The fifth stage involved simple random sampling of fifteen (15) cocoa farming households from each of the communities.

### Analytical Technique

The tools used for analysis are: Chi-Square and Mann-Whitney-U test.

#### Chi-square Analysis

Chi-square statistic was used to test the difference between by certified and uncertified groups of cocoa farming households in terms of income risk management strategies diversification employed. The statistics operates with the formula enumerated below:

$$X^2 = \sum \left[ \frac{(O_i - E_i)^2}{E_i} \right] \quad (i)$$

where:

$X^2$  = chi-square statistic;

$\sum$  = summation of

$O_i$  = observed frequency of income risk management strategies diversification employed

$E_i$  = expected frequency of income risk management strategies diversification employed

#### Mann-Whitney-U Test

This was used to determine the influence of produce certification on income risk management strategies of cocoa farming households. An income risk management diversification index (IRD) was computed for the individual farming households in the two groups i.e. certified and uncertified cocoa farming households.

The IRD is given as:

$$IRD = \frac{\sum Y_{ij}}{\sum X_{ij}} \quad (ii)$$

where:

$\sum$  = summation of

$Y_{ij}$  = total number of income risk management strategies employed by farming household

$X_{ij}$  = total number of income risk management strategies available to farming household

If  $IRD > 0.5$  high diversification and  $IRD \leq 0.5$  low diversification. A sample of  $N_x$  observations  $\{IRD_{x1}, IRD_{x2}, \dots, IRD_{xn}\}$  were aggregated into one group (i.e. certified farmers) and a sample of  $N_y$  observations  $\{IRD_{y1}, IRD_{y2}, \dots, IRD_{yn}\}$  in another group (i.e. uncertified farmers).

where:

$IRD_{x1}, IRD_{x2}, \dots, IRD_{xn}$  and  $IRD_{y1}, IRD_{y2}, \dots, IRD_{yn}$  are the income risk management strategies diversification index (IRD) by each category of farmers.

The income risk management strategies are:

$X_1$  and  $Y_1$  = source of planting materials (1 if yes and 0 otherwise)

$X_2$  and  $Y_2$  = land suitability (1 if yes and 0 otherwise)

$X_3$  and  $Y_3$  = land use maintenance (1 if yes and 0 otherwise)

$X_4$  and  $Y_4$  = sharing risk within a social network (1 if yes and 0 otherwise)

$X_5$  and  $Y_5$  = crop diversification (1 if yes and 0 otherwise)

$X_6$  and  $Y_6$  = income diversification (1 if yes and 0 otherwise)

$X_7$  and  $Y_7$  = precautionary savings (1 if yes and 0 otherwise)

$X_8$  and  $Y_8$  = insurance cover (1 if yes and 0 otherwise)

$X_9$  and  $Y_9$  = planting of hybrid cocoa seedlings (1 if yes and 0 otherwise)

$X_{10}$  and  $Y_{10}$  = diversification into non-farm activities (1 if yes and 0 otherwise)

$X_{11}$  and  $Y_{11}$  = regular cocoa spraying (1 if yes and 0 otherwise)

$X_{12}$  and  $Y_{12}$  = participation in certification program (1 if yes and 0 otherwise)

The Mann-Whitney-U test is based on a comparison of every observation  $x_i$  in the first sample with every observation  $y_j$  in the other sample. Therefore, the total number of pair wise comparisons that can be made is  $n_x n_y$ .

Total number of times  $x_i > y_j$  — denoted by  $U_x$ .

Total number of times  $y_j > x_i$  — denoted by  $U_y$ .

Hence:

$$U_x + U_y = n_x n_y \quad (iii)$$

Under the null hypothesis, it is expected that  $U_x \approx U_y$ .

$H_0: P(x_i > y_j) = 1/2$

$H_a: P(x_i > y_j) \neq 1/2$

The null hypothesis was not accepted when  $p \leq 0.05$ .

### Result

#### Produce Certification and Income Risk Management Strategies

This study classified cocoa farming households into high and low diversification income risk management strategies group. The cocoa farming households were classified into aforesaid groups by their income risk management diversification index (IRD).

Among those employing high level of income risk management diversification, 95.7% were certified cocoa farming households while 4.3% were uncertified (Table 1). On the other hand, among those employing low level of income risk management diversification, 55.5% were certified household while 44.5% were uncertified (Table 1).

Table 1: Household Distribution by Income Risk Management Strategies Diversification

Status	High diversification	Low diversification	Total
Certified	67 (95.7)	61 (55.5)	128 (71.1)
Uncertified	3 (4.3)	49 (44.5)	52 (28.9)
Total	70 (100.0)	110 (100.0)	180 (100.0)

Most (61.7%) of the households employed low level of income risk management diversification while 38.3% employed high level of income risk management diversification (Table 2). About half (52.3%) of certified cocoa farming households employed high level of risk management diversification strategies in coping with income risk while majority (94.2%) of uncertified cocoa farming households employed low level of risk management diversification strategies (Table 2). However, almost half (47.7%) of certified cocoa farming households employed low level of risk management diversification strategies (Table 2).

Table 2: Distribution of Income Risk Management Strategies Diversification

Level of diversification	Certified	Uncertified	Total
High diversification	67 (52.3)	3 (5.8)	69 (38.3)
Low diversification	61 (47.7)	49 (94.2)	111 (61.7)
Total	128 (100)	52 (100)	180 (100)
Chi-Square Statistic	123.11***		0.0001 <sup>+</sup>

Figures in parenthesis are Percentages, + <sup>®</sup>p-value  
Source: Field Survey, 2013

#### Influence of Produce Certification on Income Risk Management Strategies

Chi-square analysis ( $X^2 = 123.11$ ) shows that a significant difference ( $p < 0.01$ ) existed between the income risk management strategies employed by certified and uncertified cocoa farming households (Table 1). The Mann-Whitney-U test was used to determine the influence of certification program on income risk management practices of cocoa farming households in the study area. Results on Table 2 shows that a significant difference ( $p > 0.05$ ) existed between the income risk management practices of certified and uncertified cocoa farming households.

Table 2: Mann-Whitney U Test of Income Risk Management Strategies of Cocoa Farming Households

Category	N	Mean rank	Mann-Whitney test	p-value
Certified	128	110.69		
Uncertified	52	40.81	744.000	0.000
Total	180			

## Discussion

Results have shown that cocoa farming households participating in produce certification programme actually employed diverse income risk management strategies more than non-participant households in averting/reducing any risk occurrences. Although more participant households employed high level of income risk management strategies, cocoa farming households in general employed low level of income risk management strategies.

Albeit, from the results obtained, the more households participating in produce certification, the more the tendency of employing a high level of income risk management strategies. Consequently, produce certification has considerable influence on the use of income risk management strategies by cocoa farming households in South-west Nigeria.

## Conclusion and Recommendation

Income risk has been a major problem facing cocoa farming households in Nigeria due to some factors ranging from farmers production practices, market and human factors which has led to low cocoa income generation which in turns led to neglect of cocoa farms. In view of this, some non-governmental organizations deem it fit to proffer solutions to persistent income risk faced by cocoa farming households through setting of certain standards in cocoa production to enhance income generation and production sustainability. Cocoa certification program incorporates risk management strategies in the code of conducts ranging from sufficient knowledge on how to spray agrochemicals, child labour, proper storage and transport of cocoa produce among others. From this study, it was apparent that most (61.7%) of the farming households employed low risk management strategies in managing income risks associated with cocoa farming. However, farming households participating in cocoa certification accounted for about half (55%) of the farming households who employed low risk management strategies in managing income risks associated with cocoa farming. Hence, produce certification has been helping cocoa farming households in reducing the probability of an adverse event and the potential impact of income risk in cocoa production through the employment of diverse (risk) management strategies. In view of this, stakeholders should intensify efforts in encouraging farming households to embrace (cocoa) produce certification to be able to effectively manage income risk associated with cocoa farming.



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