International Journal of Agriculture Innovations and Research
Volume 5, Issue 5, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received: 22/12/2016 | Accepted on : 04/01/2017 | Published : 02/03/2017

The Nature, Extent and Effect of Diversification on Livelihoods of Farmers: A Case Study of the Cocoa Farmers in Ghana

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Abstract – **Livelihood diversification has become a critical part of the economic and social life of farmers. However the extent, nature and the factors that affect farmers' decisions to diversify have received little attention. This study applied a multi-stage sampling technique to interview a total of 184 cocoa farmers to examine the extent of diversification and how it affects their livelihoods. The results show that although about 70% of the farmers were diversifying into either farm, non-farm or both farm and non-farm activities, the extent of diversification by the farmers is not high, with about 30% not diversifying at all. Farmers diversifying their income in non-cocoa farm activities received much income than those who pursued on-farm diversification.**

Keywords – **Cocoa, Diversification, Farmers, Income, Livelihood.**

I. INTRODUCTION

Studies around the world indicate that farming households seldom specialize in one income-earning activity but tend to spread their risks through a number of income-generating activities (Barret et al., 2005; Carney, 2002; Ellis, 2000, Ellis& Freeman2004; Knudsen, 2007; MMYE, 2008; Lay & Schuler, 2007; Scoones, 1998; Stifel, 2010). People from low-income countries in Africa generally and across the socio-economic groups, endeavour to diversify their productive activities, sources of income, and households' resources to sustain their wellbeing (Barrett et al., 2001b; Ellis, 2000, 1998; Hart, 1994; Stakhanov 2010; Von Braun & Pandya-Lorch, 1991). This is due to a combination of different factors. According to Oxfam (2014), cocoa farmers across the world receive only 3% of the retail price of a chocolate bar in 2012. The average income per capita per day is estimated at around $1 (Cocoa Barometer, 2012, 2015; Hainmueller et al., 2011; KPMG, 2011).The rippling effects of low income are that farmers are unable to purchase agrochemicals to fight pest and disease or fertiliser to improve the soil fertility that has deteriorated due to unsustainable farming practices over the years (Hainmueller et al., 2011).

This unsustainable farming practices is threatening the future of cocoa farming and poses a danger to the environment. One response to this situation is diversification. Many studies point to the fact that while cocoa farmers consider the cocoa as a security and remain the main economic activity of most farmers, they generally also seek alternative sources of income (Baah, 2009; Hill, 1964; Knudsen, 2007; MMYE, 2008) and embark on 'income smoothing' (Dercon, 2002: 150) strategies. Livelihood diversification is a critical part of the economic and social life of farmers.

The context within which cocoa farming operates in Ghana, the resources and assets status of cocoa farmers are fundamental to an understanding of the options open to their strategies adopted to attain livelihoods, the outcomes they aspire to and the vulnerability context under which they operate (Ellis, 2000). In order to meet household needs, farmers increasingly construct an asset-income mix to increase their income and reduce their vulnerability. Farming households require social, physical, financial, natural and human capital or resources to diversify their livelihoods (Carney, 1998; de Janvry & Sadoulet, 2000); the extent to which they diversify depends on their asset mix or capital available and the capabilities of the farming household (Asmah, 2011; Barret et al., 2002). The factors that affect cocoa farmers' decisions to diversify in Ghana have received little attention. This lack also applies to how the choice to remain in agriculture or to carry out non-farm activities impact on their livelihoods. In this paper, the concept of livelihood diversification was employed, referring to the process whereby households construct their livelihoods from a range of activities in their struggle to survive and cope with or recover from stress and shocks and in order to improve their standard of living (Chambers & Conway, 1993; Ellis, 2000; Knudson, 2007). The objective of the study was to assess the nature and extent of diversification and its effect on income of farmers. Specific questions raised were:

1. How are farmers diversifying their livelihood sources and what is the extent of farmers' diversification activities (farm & non-farm)?
2. What are the effects of diversification on income of cocoa farmers?

II. METHODOLOGY

In order to address the research questions, the various income sources of the cocoa farmers were first identified through a total of 184 household interviews conducted in six communities located in three districts in three different Regions (Table 2.1). These were supported by desk review, the FGDs and key informant interviews. To analyse the household interviews, Simpson's Index of Diversity (SID) was used.

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Volume 5, Issue 5, ISSN (Online) 2319-1473

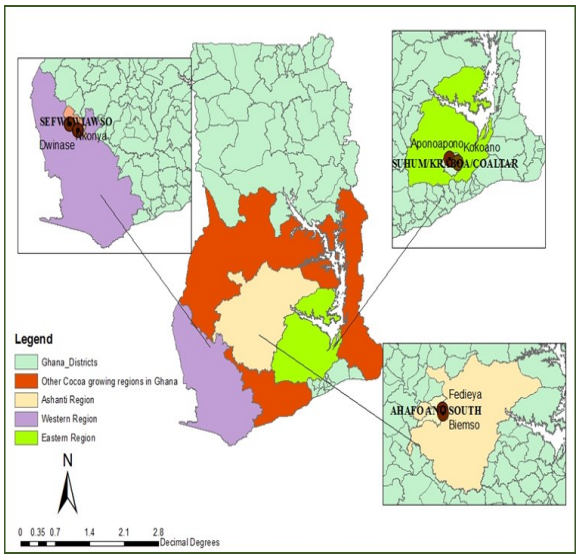

Fig. 2.1. Study Area

2.1. *Simpson's Index of Diversity (SID)*

SID provides a realistic and efficient means to estimate the extent of diversification of a household. It has been used widely for assessing livelihood diversification (e.g. Agyeman, 2014; Aneani et al., 2011; Saha & Bahal, 2010; Sujithkumar, 2007) and was thus employed here also. As in Aneani et al. (2011), Minot et al. (2006) and Saha and Bahal (2010), the income values from the various sources are used to estimate the index, which measures the extent of diversification of households.

SID is empirically estimated as

$$SID = 1 - \sum_{i=1}^{n} P_i^2 \quad (1)$$

where P_i is the proportion of income coming from the source i.

The value of SID always falls between 0 and 1. If there is just one source of income, then $\sum_{i=1}^{n} P_i^2 = 1$, so *SID = 0,* indicating little or no diversification. As the individual increases in diversification and the number of sources of income increases, the shares (*Pi*) together with the sum of squared shares decline, so that SID approaches 1. Farmers with SID values closer to 1 mean that the farmers are engaged in more diversification activities than farmers with SID values closer to zero.

2.2 *Data Collection*

In order to select the households, a multi-stage sampling procedure involving purposive sampling and random probability sampling was used. The purposive sampling was used to select regions in Ghana that have (1) highest, (11) average and (111)lowest cocoa production yields, in order to ensure a spread of farmers and avoid any data bias. From the six cocoa growing regions in Ghana, Western (1), Ashanti (11) and Eastern Regions (111) were selected. After the purposive sampling, one district and then two communities within each selected region were randomly sampled, making a total of six communities in three districts. This was followed by a non-zero random probability sampling of respondents, used to ensure that the sample was a fair representation of the cocoa farmer population in the selected communities.

In Western Region, the Sefwi Wiawso Municipality was chosen, from where the two farming communities of Dwinase and Nkonya were picked. A total of 64 farmers were randomly selected and interviewed from the Wiawso Municipality. In the Ashanti and Eastern Regions, the Ahafo-Ano South and Suhum Kraboa Coaltar districts were selected respectively from which 60 respondents were interviewed from each district. The selected communities were Biemso and Fedieyain Ashanti and Aponoapono and Kokoanoin the Eastern Region.

2.3. *Empirical Snalysis*

In order to identify and estimate the effect of the factors that affect the diversification behaviour of cocoa farmers in Ghana, a quantitative response model based on expected utility was used to model the factors that affect the diversification behaviour of cocoa farmers. The quantitative model selected for this study is the multinomial logit model. The multinomial model was chosen because it is able to handle dependent variables with more than two categories (Greene, 2003). The respondents' choices of diversification activities were classified into four categories, namely, no diversification, farm diversification, non-farm diversification and both farm and non-farm diversification. The classifications were used as a categorical dependent variable (D_i) in the multinomial regression model. The choice by cocoa farmers between income sources is explained as one providing a higher utility. Cocoa farmers' decisions placing them into a particular type of category are influenced by a vector of explanatory variables, X, listed as environmental, socio economic, cultural and institutional factors (Barghouti et al., 2004; Greene 2003, Truong Thi Ngoc Chi et al., 2003).

Specification of Model Variables

The dependent variable in the empirical estimation for this study is the choice of diversification of income sources categorized as 0 (no diversification, cocoa production alone), 1 (farm diversification, farming only), 2 (non-farm diversification only) and 3 (both farm and non-farm diversification). For the purposes of this study, the no diversification category is used as the base category as a measure of diversification decision. The explanatory variables were chosen after reviewing the literature (works that discussed the factors that affected farmers' diversification decision), as well as considering the availability of data from cocoa farmers.

The variables thus selected as factors that could influence the farmers' diversification decision are location (with Western Region, the highest producer, as base), age, years of education, marital status, years of cocoa farming, income from cocoa, farmers' household expenditure, extent of use of own labour for cocoa, access to extension services and whether farmers are part of farmer based organisations (FBOs). Table 2.2 summarises the description and measure the expected influence of explanatory variables used. Regarding the expected influence, it is assumed from literature that, for example, respondents with a higher level of education would be more willing to diversify into either farm or non-farm activities and therefore a positive sign is shown, whereas

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marital status was not anticipated as being particularly relevant, so both positive and negative signs are shown.

Table 2.2. Multinomial Logit Model: Variables, Measures and Expected Sign

Variable	Measure	Expected Sign
Ashanti Region	1=Yes, 0=Otherwise	+/-
Eastern Region	1=Yes, 0=Otherwise	+/-
Age	Years	-
Years of education	Years	+
Marital status	0=Single 1=Married 2=Divorced/Separated 3=Widowed	+/-
Years of cocoa farming	1=Male, 0=Female	+/-
Income from cocoa	Ghanaian cedis	+/-
Expenditure	Ghanaian cedis	+/-
Extent of use of own labour for cocoa	%	-
Access to extension	1=Yes, 0=No	+
Part of FBO	1=Yes, 0=No	+/-

III. Findings and Discussions

3.1. *Background Information Respondents*

A brief description of the respondents' backgrounds is given for a better understanding of the various factors that influence diversification. The figures given in parentheses here are approximated, with more accurate numbers given below (Table 3.1).

Level of Education

Most of the farmers interviewed (65%) had only basic education, while 20% had no formal education at all. Very few (less than 2%)had attained tertiary education. Thus, the cocoa farming activities in these three regions are undertaken by mainly illiterate and semi-illiterate people.

Marital Status

The majority of respondents (75%) were married. Approximately 10% were divorcees, while 12% were widow(er)s.

Main Occupation

Most of the farmers interviewed (90%) had cocoa farming as their main occupation. Only 1%were salaried workers and 3% had petty trading and craftsmanship as their main occupation. However, only about a third (35%) of the respondents relied solely on cocoa as their source of income; the remaining two-thirds (65%)had other sources of income, apart from cocoa. This implies that most of the farmers had diversified. Ashanti Region had the highest percentage of farmers (97%) with cocoa as their primary occupation, followed by Western Region (92%) and Eastern Region (83%).Whilst 40% of the respondents in Western Region had cocoa farming as the only source of income, only 25% and 23% of cocoa farmers in the Ashanti and Eastern Regions, respectively, had cocoa as their only source of income.

Head of Household

The majority of respondents (80%) were heads of households.

Age of Respondents

Most of the respondents (70%) were below sixty years and the other 30% were sixty and above. In terms of location, about 58%, 78% and 73% of the respondents were below sixty years in Western, Ashanti and Eastern regions, respectively.

Table 3.1. Respondent Backgrounds

Variables		Region			Overall (184)
		WR(n=64)	AR(n=60)	ER (n=60)	
Gender	Male	59.4	48.3	80.0	62.5
	Female	40.6	51.7	20.0	37.5
Level of Education	None	12.5	36.7	11.7	20.1
	Basic	67.2	55.0	71.7	64.7
	Secondary	17.2	6.7	16.7	13.6
	Tertiary	3.1	1.7	--	1.6
Marital Status	Single	3.1	--	3.3	2.2
	Married	76.6	73.3	76.7	75.5
	Divorced	10.9	8.3	11.7	10.3
	Widowed	9.4	18.3	8.3	11.9
Head of Household		81.3	70.0	93.3	81.5
Main Occupation	Cocoa Farming	92.2	96.7	83.3	90.8
	Petty Trading	1.6	1.7	5.0	2.7
	Craftsmanship	1.6	1.7	5.0	2.7
	Salaried Worker	3.1	--	--	1.1
	Other	1.6	--	6.7	2.7
Cocoa only Income Source		40.6	25.0	23.3	34.8
Age of Respondent	Below Sixty Years	78%	58%	73%	70%
	Sixty and Above	22%	42%	27%	30%
Distance to Market (miles)	Minimum	0.43	0.1	0.8	0.1
	Maximum	3.6	4.83	15.6	15.6
	Mean	2.5	1.2	5.6	3.1

3.2 *The Nature and Extent of Diversification of Cocoa Production*

Seventy per cent of the farmers interviewed were found to be diversifying their income sources, out of which well over a third of the farmers were involved in farm diversification, and over a quarter were involved in non-farm activities. Very few engaged in both (farm and non-farm) diversification activities to earn incomes (Fig. 3.1). A significant number of respondents, 129 from 184 (about 70%) of the farmers employed either farm, non-farm or both farm and non-farm diversification with the remaining 30% engaged only in cocoa production.

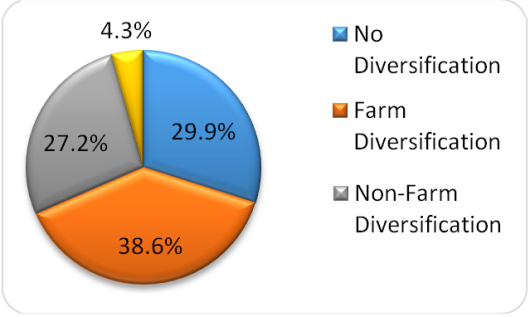

Fig. 3.1. Distribution of Farmers by Diversification Category

Table 3.2 presents the diversification activities and Table 3.3 the estimated diversification indices. About 43% of the farmers who practice farm diversification usually produced food crops, such as plantain, cassava, banana, cocoyam, 'vegetables' (peppers, garden eggs, okro, tomatoes, etc.) and maize. Only 16% of this category produced cash crops, such as rubber, palm fruits and teak. A very few of the farmers (less than 2%) were involved in livestock production or sale of animals, such as chicken, goat, cattle, pigs, grass cutter and sheep. Nearly one in twenty of the respondents were involved in other agricultural activities, such as hunting and fire wood collection. In the case of non-farm sources of livelihood, the farmers usually engaged in the following activities: petty trading (15%), working in the formal sector, such as teaching and district office work (5%), handicrafts, such as dress-making (4%) and artisanship, such as construction (3%).

The FGDs confirmed that while most of the males were involved in other non-farm diversification activities, generally most of the women farmers were involved in petty trading, which involved activities such as food sales, fish mongering, selling alcoholic beverages (e.g. the local gin, *akpeteshie*) and other general items or groceries and stationery (exercise books, toffees, biscuits, water, etc). There is a general perception that petty trading is 'work for women' (*emaaadwuma*). Even though this perception is rapidly changing in the urban areas, it is still strongly held in the rural communities.

Table 3.2. Diversification Activities

Activities	Percentage
Farm diversification activities	
Food crops	43.4
Cash crops	15.5
Animal sales/ livestock rearing	1.6
Other agricultural	4.7
Non-farm diversification activities	
Petty trading	14.7
Handicrafts	3.9
Transport businesses	1.6
Masonry, construction work	3.9
Mining (quarrying)	0
Salaried worker (formal sector)	5.4
Artisan	3.1
General Trade in non-agricultural produce	2.3
Others (such as clergy)	12.4

The major reason for cocoa farmers' diversification was to increase their income and food security, reduce vulnerability and spread risk. These findings are in agreement with several studies that have concluded that cocoa farmers improve their income by diversifying into either farm or non-farm activities (Aneani et al, 2011; Asmah, 2011; Barrett et al, 2001; Mollers et al., 2006). For example, Aneani et al. (2011) demonstrated that cocoa farmers have diversified from cocoa cultivation by growing other crops, such as oil palm, citrus, cassava and cocoyam, to expand their sources of income. Cocoa farmers usually diversify in order to maintain a flow of income throughout the year due to the seasonality of cocoa, as well as to take advantage of the perceived good prices of other produce and tackle the significant problems with rehabilitation of existing cocoa farms (MASDAR, 1998). In addition, the FGDs revealed that the non-cash crop proceeds were used for day-to-day household expenditures, including child care, medical bills, funeral and other social responsibilities. Cocoa farmers were thus engaged in farm and non-farm activities, such as producing foodstuffs and also some petty trading, to augment their income.

3.3 *The Extent of Diversification*

Table 3. 3. Type of Diversification and Estimated Index

	Min.	Max.	Mean	Std. Dev.
SID	-	0.66	0.24	0.21
No Diversification	-	-	-	-
Farm Diversification	-	0.66	0.32	0.19
Non-Farm Diversification	-	0.63	0.35	0.16
Both Farm and Non-Farm Diversification	0.20	0.57	0.43	0.12

The study found that even though most farmers were diversifying, the extent of diversification was not high relative to total income with the maximum SID of 0.66 with a mean of 0.24. This is in contrast with Aneani et al. (2011) who found a SID approaching 1, showing high diversification. However, the SID recorded by this study (0.66) is higher than the 0.338 generated by Agyeman et al. (2014).

3.4. *Effects of Diversification on Farmers Income*

Table 3.4 illustrates the farmer diversification categories, their respective incomes and production. The results from the study indicate that the farmers in the no-diversification group produced an average of almost ten bags of cocoa in the 2013-14 cocoa season and earned an average of GHC1,998 from their cocoa. All the farmers who had diversified were engaged in between one and three business activities (farm, non-farm or both). It is interesting to note that while, on average, the farmers who diversified into only-farm activities produced 7.9 bags, which is just fraction less than did those who diversified into other non-farm activities, who produced 8.0 bags, but both of these had a much loweraverage output (about 6.3 bags) than the 14.3 bags of those engaged in both farm and non-farm activities.

The total average income of farmers who diversified in both farm and non-farm activities is GhC5,606 which is over 13% more than the total average income of GhC 4,863 for farmers who diversified into only non-farm activities and 49% more than the total average income (GhC2,482) of farmers who diversified into only-farming activities. It is observed that the extent of diversification of farmers into both farm and non-farm activities is higher than those into either non-farm diversification or farm-only diversification, with the farmers engaged in both farm and non-farm activities having the highest total income. These results confirm the assertion that diversification by cocoa farmers can help improve their livelihoods. Obviously whilst farmers who do not diversify derive all

of their income from cocoa activities, farmers who diversify into (other) farm production gain 64.3% of their income from cocoa, and farmers who diversify into non-farm activities receive 66.6% of their income from non-cocoa activities. Most importantly, the results showed that farmers who diversified into both farm and non-farm activities have cocoa contributing more of their income (51.6%) compared to the contribution of non-cocoa income (48.4%). This is an indication that despite the importance of diversification, income from cocoa is still very important to farmers since it contributes more to the income of all the farmers but for those diversifying into non-farm activities.

Table 3.4. Bags of Cocoa Harvested and Corresponding Income of Respondents

Form of Diversification	No Diversification		Farm Diversification		Non-farm Diversification		Both farm& non-farm	
	Sum	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**
Number of bags	544.0	9.9	561.5	7.9	401.9	8.0	114.5	14.3
Income from cocoa (GHC)	109,890	1,998	113,423	1,598	81,176	1,624	23,129	2,891
Income from other sources (GHC)	-	-	62,847	885	161,980	3,240	21,720	2,715
Total income (GHC)	109,890	1,998	176,270	2,483	243,156	4,863	44,849	5,606
Contribution of cocoa income to total income (%)	100		64.3		33.4		51.6	
Contribution of non-cocoa income to total income (%)	-		35.7		66.6		48.4	
Number of sources of income	55	1	143	2.01	98	1.96	24	3

IV. Conclusions

The study sought to assess the diversification of livelihoods by cocoa farmers in Ghana and applied a multi-stage sampling technique to interview a total of 184cocoa farmers from the Western, Ashanti and Eastern Regions. It sought to also ascertain the nature and extent of diversification, as well as the effects of this on their income. The results show that although about 70% of the farmers were diversifying into either farm, non-farm or both farm and non-farm activities, the extent of diversification by the farmers is not high, with about 30% not diversifying at all.

The relatively low extent of diversification was confirmed by an estimated maximum SID diversification index of 0.66. However the study observed that those who diversified more had higher estimated average SIDs.

Again the findings suggest that farmers who diversified into both farm and non-farm activities are likely to have higher cocoa productivity (over fourteen bags) as well as a higher average income than did the farmers who either did not diversify or who did so but only into either farm or non-farm activities. The study concludes that farmers who diversified were better off than those who did not diversify at all and that non-farm diversification yields better incomes than farm diversification. Indeed, there was a growing importance of income and resources from non-farm activities; nevertheless, income from cocoa continues to constitute a larger portion of household income as well as the demand for non-farm goods and investment in the non-farm sector. There were no indications that farmers were leaving cocoa or that land is losing its importance for livelihoods. This paper asserts a fluid movement of labour to cocoa and vice versa. Reducing owners' involvement in cocoa production means employing farm-hands so that both farm and non-farm activities can be developed.

Acknowledgment

This article was gleaned from the thesis with the title Certifications, Child Labour and Livelihood Strategies: An Analysis of Cocoa Production in Ghana funded by NUFFIC of the Netherlands and conducted under the auspices of Wageningen University, School of Social Sciences.

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Prof. dr. Guido Ruivenkamp is Associate Professor at the Sociology and Anthropology of Development section of Wageningen University and Extraordinary Professor at the University of Humanistic Studies at Utrecht, the Netherlands. His main research interests are societal aspects of life science technologies, particularly biotechnology and genomics, regarding sustainable agriculture and food production and an exploration of commons based knowledge production and perspectives for commonization of agriculture. Guido Ruivenkamp is supervising various PhD research projects on local food networks in underdeveloped countries and on open source and commons-based approaches in the context of agro-food research networks in order to support locally-based food production systems and alternative (nonproprietary) modes of innovation. Main theoretical frameworks are critical theory, critical constructivist technology approaches, biopolitics and subpoliticizing products. Guido Ruivenkamp is an associate Professor at Wageningen University in the Netherlands. He heads the Critical Technology Construction group at the University. He has over 15 publications to his credit such as *From Prescription to reconstruction: Opportunities for Sub political Choices in Biotechnological and Genomics Research* and *Tailor-made biotechnologies for Endogenous Developments and the Creation of New Networks and Knowledge Means*

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