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Evaluating the Impact of Rural Finance on Cocoa Farmers Productivity: A Case Study of Bodi District in Ghana

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Authors' contributions

This work was carried out in collaboration among all authors. Author CJ designed the study, fund acquisition and supervision. Author SGA performed the statistical analysis, wrote the first draft of the manuscript and prepared the final draft. Author YOK managed the literature search and review. All authors read and approved the final manuscript.

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ABSTRACT

Background: Agricultural finance from rural and community banks play a major role in increasing both yield and income of rural farmers in agricultural-dependent economies. These finances are needed for purchasing raw materials, paying labor fees and buying farming equipment, etc. However, substantial evidence about their roles in improving farm productivity is lacking, especially in the cocoa sector in Ghana, where rural and community banks are the forerunners in advancing credit to cocoa farmers in Ghana's deprived rural cocoa-growing communities. This research, therefore, seeks to determine the impact of rural and community banks' credit on cocoa farmers' productivity in the Bodi District of Ghana.
Methodology: Using random sampling method, a cross-sectional data of 350 cocoa farmers from 5 operational areas (Afere, Bodi, Amoaya, Kama and Suino) located in Bodi District in the Western

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region. The data were analyzed using descriptive statistics and logistic regression models. Statistical software (SPSS v20 and STATA v14) were used to analyze quantitative data on cocoa productivity.

Results: The results revealed that cocoa farmers with access to credit experienced significant yield increase ($p<0.05$) with a mean of 359.71 $kgha^{-1}$ as compared to 235.30 $kgha^{-1}$ for non-credit takers. Further, only 34.3% of farmers accessed credit for farming. With Pseudo R^2 value of 0.78, farm tenure system, fertilizer use, access to credit and access to extension services significantly influenced cocoa yield, while the age of cocoa farmer, age of farm trees and vulnerability of farm to natural disaster negatively affected cocoa yield. Tukey HSD results ($p<0.00$) indicate that rural banks credit allocations to non-agricultural activities such as trade and transport, and social loans had the highest percentage means which suggests that agriculture is treated less favorable in rural banks' credit portfolio. These findings give credence to the assertion that rural banks are deviating from their core mandate of supporting agriculture in Ghana.

Conclusion: This study reaffirms the supporting roles played by rural and community banks in increasing cocoa yield in Ghana. However, this research recommends that, the Bank of Ghana should closely monitor the activities of these unit banks to reduce the instances of diverting all their funds to non-agricultural related activities.

Keywords: Cocoa; collateral security; credit; Ghana; rural and community bank; yield.

1. INTRODUCTION

Globally, agricultural production has increased rapidly due to several decisive factors, among which the availability of formal credit sources is the most important [1]. The influential determinants of agricultural development are quality inputs, adopting advanced research technology, good government policies and the achievement of production efficiency which are all subject to availability of credit [2]. In developing countries where farms are operated on a smallholder basis with a lack of finance, agricultural credit plays an important role in the purchase of farm inputs and relevant modern technology to increase farm productivity. In Ghana, agriculture accounts for 33 percent of gross domestic product (GDP) and contributes 60 percent of export earnings. Although the share of agriculture's contribution to Ghana's GDP has declined over the years, it remains a very strong pillar in the economy. A major cause of the growth of agriculture is the crop sector of which cocoa is the largest subsector, accounting for about 31 percent. Ghana was the major exporter of cocoa since the 1910s and held this position until 1976 when it lost it to Cote D'Ivoire [3]. Agriculture is predominantly on smallholder basis, absorbing about 42 percent of the labor force [3]. The rural farmers are faced with many productions problems scaling from lack of good roads, credit facilities, farm inputs, farm machinery, extension services, storage facilities, to uncertain weather patterns. In the face of such problems, small-scale farmers are considered to have high poverty levels. However, cocoa is a major source of foreign export earner for the country and contribute about 9 percent of the country's gross domestic product. However, cocoa farmers are still poor because the Ghanaian cocoa sector is faced with many problems such as declining soil fertility, high incidence of pest and diseases and exposure to droughts and temperature extremes, coupled with poor agronomic practices and inadequate farm maintenance by aged farmers [4]. In Ghana, average cocoa yield is estimated to be 350 $kgha^{-1}$, Cote D'Ivoire's average cocoa yield is 700 $kgha^{-1}$ and that of Malaysia is 1600 $kgha^{-1}$ [5]. Consequently, for many years, the livelihoods of cocoa households have deteriorated making them to abandon their cocoa farms. Hence, credit from formal sources such as rural and community banks (RCB's) and registered micro-finance institutions provide financial relief for cocoa farmers. While the majority of agricultural stakeholders are of the view that rural and community banks are acting more on profit motives, farmers are also of the view that credit sources from these financial institutions don't necessarily increase productivity but creates indebtedness.

The availability of formal credit is a prerequisite for the adoption and diffusion of innovative and high-impact technologies in agriculture and the enhancing of agriculture growth [6]. The improved technologies in agriculture productivity are almost being associated with increased demand for working and fixed capital, hence, finance is fundamental to increased agricultural productivity in developing countries. Patel [1]

postulates that the income status of most farmers in undeveloped countries are very low and their productivity depends solely on the variability of weather, hence effective financial intermediation in rural farming communities is important in the sense that farmers can use the credit to cushion against unforeseen shocks and provide insurance relief against future risks and thus, reduce the need to liquidate their productive asserts. Although informal lenders are present, farmers cannot receive an adequate amount of credit for undertaking high technology projects. Donald [7] in his research on issues in rural finance revealed that the idea of rural banking for supporting all categories of deprived farmers in rural communities was first conceived in Indonesia. In Papua New Guinea, Kannapiran [8] highlighted the role of sustainable rural credit in promoting cocoa production and maintaining farmers' livelihoods.

According to Steel and Andah [9], rural and community banks are owned by members of the rural community through the purchase of shares, licensed and regulated by the Bank of Ghana. These licensed unit banks are tasked to provide financial intermediation in rural areas where bigger commercial banks find less attractive to establish their branches. The Bank of Ghana realizing the importance of agriculture and rural development established the Agriculture Development Bank in 1965 in selected rural communities to solely initiate credit facilities to cocoa farmers. The banks' disappointing performance resulting from the treating of agriculture loans less favorable in their credit portfolio allocations. To minimize the unsatisfactory performance, the Government considered establishing community banks with emphasis on cocoa-growing rural areas. The first rural bank was established in 1976, currently, a total of 140 rural and community banks are widely distributed in all regions of the country and supervised by the Association of Rural Banks. The Association of Rural Banks mandates all rural banks to facilitate rural savings mobilizations, offer credits and other banking services to the rural poor and finally act as a beckon of rural development. Rural Banks were mandated to allocate 50 percent of their credit portfolio to agriculture, 30 percent to cottage industries and 20 percent to trade. These rural banks failed to give high priority to agriculture thereby treating it less favorably as compared to other economic sectors. Many publications focused on either the regional context of the country in addressing the significance of rural banks while others focused on the crop sub-sector at large. For instance, Kadri, and Afful et al. [10,11] evaluated the importance of rural banks in Ghana and come to a conclusion that the agriculture sector was deprived of working capital as compared to the other sub-sectors of the economy. The limitation of these studies is their inability to identify an export earning crop and point out the importance of rural credit in its productivity. Since Ghana's cocoa is a major export earner and sold to many countries for processing into chocolates, beverages, and cocoa powder, it is relevant to identify key factors that contribute to effective productivity. Given the gap that exists in research, this study was conducted with the main objective to determine the effect of rural bank's credit on cocoa farmers yield and also quantitatively evaluate the credit portfolio allocation of the two rural banks in the study area.

2. MATERIALS AND METHODS

2.1 Study Site

Bodi District, one of the twenty-two districts in the Western Region is located between latitude 6°6′N and 7°0' N, and longitude 2°40'W and 3°, 15 W. The district has a surface area of about 641square kilometres. It has a population of about 64,931. It is located in the Northern part of the Western Region of Ghana with Sefwi-Bodi as its district capital. The district forms part of the country's wet semi-equatorial climatic zone. The zone is characterized by two rainfall regimes with mean annual rainfall figures ranging from 1,260-2,000 mm. Cocoa is grown in almost all communities in the district.

2.2 Sampling Technique

The target population of this study were cocoa farmers from the Bodi District of the Western Region. A three-stage random sampling technique was adopted in the farmer selection process. The services of agricultural extension agents in the district were considered for this research for data collection. The Ministry of Food and Agriculture has divided the agricultural communities into segments called operational areas, hence seven operational areas exist within the domain of classification. The first sampling stage involved selecting five operations areas namely; Afere, Bodi, Amoaya, Kama and Suino. Secondly, two major cocoa-growing communities were selected from each operational area. Finally, thirty-five cocoa

farmers were selected from each farming community.A total sample size of 350 respondents was used for the research. Rural and Community Banks were also selected in the process.

2.3 Data Collection

Cross-sectional data from cocoa farmers were collected by structured questionnaires. The questionnaire was pre-tested with a group of 60 cocoa farmers to correct for difficulties in interpretation and provide order bias. Primary data collected includes a demographic profile of cocoa farmers such as age, family size, education status, farming experience, farm size, the tenure system, and gender. Information about cocoa farmers' rural bank credit utilization and impact on total cocoa productivity was also solicited. After data collection, 120 respondents utilized rural banks' credit for farming, while the remaining 230 respondents have to rely on other sources of finance for farming (see Table 3 in section 3.2). The second source of primary data was from the only two rural and community banks operating in the district. The rural bank data included the banks' credit portfolio allocations among the agricultural, trade, transport and the industrial sectors respectively. Supporting secondary data was from published scholarly journals, Ministry of Food and Agriculture archives, internet and Ghana Cocoa Board repository. The research was conducted from January to November 2018.

2.4 Data Analysis Techniques

Statistical software (SPSS v20 and STATA v14) was used to analyze quantitative data on cocoa productivity. A two-tailed student t-test assuming independent group means was used to test the significance between the mean productivity of rural bank credit takers (CT) and non-credit takers (NCT). Logistic regression was adopted to determine the factors affecting the yield of selected farmers. The portfolio characteristics of the two major rural banks were compared using ANOVA, while the Tukey-Kramer procedure used to determine the sectoral allocation of credit between agriculture, trade and cottage industries.

2.5 Theoretical Framework

The theory supporting this study is farmers utility maximization concerning credit use for cocoa production. Thus, for cocoa farmers to decide whether or not to take rural credit for farming does not only depend on profit made but how effectively the credit is contributing to increase in cocoa production. According to Zeller [12], rural farmers in agriculture act economically rationally within the context of available resources and existing technology. Appropriately, rural farmers assign resources in line with the neo-classical profit maximization model. In the context of this study, the cocoa farmers decide to use rural banks credit for farming based on anticipated utility maximization. But more importantly as demonstrated by Jugale [13], a farmer J_s anticipated utility of efficient production from use and non-use of credit can be expressed as follows:

$$EU_{tj} = \beta_t L_j + \tau_{tj} \quad (1)$$

$$EU_{mj} = \beta_m L_J + \tau_{mj} \quad (2)$$

Table 1. Priori expectations for explanatory variables

Variable	Description	Measurement	Expectation
Education	Education level of farmer	1 = non, 2 = primary, 3 = junior high, 4 = senior high, 5 = tertiary	+
Farm Tenure	Farm ownership	1=own farm, 2=family farm, 3=sharecropper	+
Fertilizer and Pesticide	Use of fertilizer and pesticide	Dummy: 0=no, 1=yes	+
Farmer Age	Age of farmer	Years	+
Farm Age	Age of farm trees	Years	+
Credit	Access to credit	Dummy: 0=no access, 1= access	+
Extension Service	Extension services access	Dummy: 0= no access, 1= access	+
Farming Experience	Farmers experience	Years	+
Member of FBO	FBO member	Dummy: 0=no, 1=yes	+
Natural Disaster	Vulnerability to disaster	Dummy: 0=no, 1=yes	-

Where EU_{tj} and EU_{mj} represent anticipated production utility with non-access and access to rural bank's credit, and L denotes a set of cocoa farmers' socioeconomic and demographic characteristics. Also, τ is a random disturbance and assumed to be independently and identically distributed with mean zero. The difference in expected production utility may be considered as:

$$EU_{mj}-EU_{tj} = (\beta_m L_J+\tau_{mj})-(\beta_t L_J+\tau_{tj}) \quad (3)$$

$$(\beta_m-\beta_t)L_J+(\tau_{mj}-\tau_{tj})=\beta L_J+\tau_j \quad (4)$$

If $EU_{mj} - EU_{tj} > 0$, the cocoa farmer will use rural banks' credit for effective cocoa production. Therefore, the difference between the anticipated utility of maximum productivity will be the leading factor for a farmer to adopt a rural bank's credit. Furthermore, Jugale's [13] theory of "demand and supply of agricultural credit" highlighted that farmers' demands for credit depend on factors such as cost of credit, the efficiency of credit, repaying capacity and farm production predictability. While the supply of agricultural credit depends on the degree of risk and uncertainties in lending, prospects of financial agencies, alternative opportunities for investment and level of savings and capital formation.

2.6 Empirical Model

The hypothesis to be tested is:

$H_0: \mu_{CT}=\mu_{NCT}$

$H_1: \mu_{CT}\neq\mu_{NCT}$

Where:

μ_{CT} – yield of credit takers

μ_{NCT} – yield of non-credit takers

Binomial logistic regression was used to identify factors that determine the yield of cocoa farmers. As adopted by Norton et al. [14], the logistic model was estimated using the following equation:

$$Y_i=\beta_0+\beta_1(\text{Education})+\beta_2(\text{Farm Tenure})+\beta_3(\text{Fertilizer Use})+\beta_4(\text{Farmer Age})+\beta_5(\text{Farm Age})+\beta_6(\text{Credit})+\beta_7(\text{Extension Access})+\beta_8(\text{Experience})+\beta_9(\text{Member of FBO})+\beta_{10}(\text{Disaster})+\varepsilon_i \quad (5)$$

Where Y_i is the dependent variable measured in $kgha^{-1}$ of farmer's cocoa yield, $\beta_0$is the constant term; β_1 to β_{10} represent the coefficients of explanatory variables and ε_i the error term. The priori expectations are presented in Table 1.

3. RESULTS AND DISCUSSION

3.1 Demographic Characteristics

The demographic characteristics of farmers are presented in Table 2. The majority (93.7%) of the respondents were males implying that cocoa

Table 2. Demographic characteristics of respondents (N=350)

Variables	Category	Frequency	Percentage
Gender	Male	328	93.7
	Female	22	6.3
Age of Farmer (years)	20-40	100	28.6
	41-60	93	26.6
	>60	157	44.9
Educational Level	None	177	50.6
	Primary	116	33.1
	Junior	13	3.7
	Secondary	15	4.3
	Tertiary	29	8.3
Farm Size (Hectares)	1-3	195	55.7
	4-7	116	33.1
	>7	39	11.1
Age of Farm (years)	1-4	3	0.9
	5-10	92	26.3
	11-20	181	51.7
	>20	74	21.1
Tenure System	Own farm	219	62.6
	Family farm	94	29.9
	Sharecropper	37	10.6

farming in the study area is male-dominated. A total of 44.9% of the farmers were aged above 60 years suggesting that cocoa farms in the study area will need younger farmers in the nearest future. However, due to the system of inheritance, farms are transferred to family members after the death of the owners. In terms of education, a majority (50.6%) of farmers were illiterates suggesting that most cocoa farmers in the region need to be engaged through extension education for knowledge transfer and technology adoption. The high rate of illiteracy among cocoa farmers is possible because most cocoa farms are located in rural communities with lack of basic schools. Moreover, the study revealed that 55.7% of farmers were cultivating farm sizes between 1-3 hectares, while 33.1% cultivating between 4-7 hectares and only 11.1% cultivating more than 7 hectares. The results align with the findings of Danso-Abbeam [15] who reported that about 50% of cocoa farmers in Ghana have farm sizes less than 2 hectares. However, more than 50 percent of the respondents were operating cocoa farms between 11-20 years. Finally, 62.6% of farmers owned their farms while 29.9% managed family farms and 10.6% operated as sharecroppers.

3.2 Access to Rural Banks Credit

Different sources of credit used by cocoa farmers as well as the constraints faced in their bid to access credit are presented in Table 3. According to Essel and Newsome [16], access to institutional credit by cocoa farmers is affected by many requirements such as stable income, up-to-date farm records and more importantly collateral security in the form of landed property which the bank can confiscate in case of default. Since major commercial banks in the country are not interested in advancing credit to rural farmers, rural and community banks (RCBs) become very important sources of credit. It was discovered that whereas a little over a quarter financed their cocoa farms through formal credit sources, almost three-quarters used informal credit sources. This observation is in support of the assertion by Donald [7] that the majority of rural credit comes from the informal sector. Also, farmers who financed their farms with informal credit, 35.7% used money from family and friends while 26.6% relied on self-savings. Another crucial observation that emerged from the results is linked to the observation that no farmer used credit from money lenders. As the farmers put it, money lenders charge high interest rates on their credit which deter farmers from borrowing. Among the respondents who did not take credit, 64.8% ranked collateral security as their main bottle-neck, while these findings concluded that collateral security is a major requirement deemed necessary by rural banks before granting loans to rural farmers [17,18].

3.3 Factors Affecting Cocoa Yield

The results of the logistic regression model to identify factors affecting the yield of sampled cocoa farmers represented in Table 4. Using the specifications with the dependent variable measured as the total yield for minor and major cocoa seasons, maximum likelihood estimates were developed for all parameters. The coefficient of determination, R^2 of 0.78 indicates that about 78% of the variation in cocoa yield could be explained by the explanatory variables. Farm tenure, fertilizer use, farm age, access to credit, extension service and vulnerability of farm to natural disaster were the main determining factors influencing cocoa yield. Farm tenure was significant at 5% indicating that farmers who own their farms were more likely to have higher yields than sharecroppers and those managing family farms. This conformed to the priori expectation in Table 1, section 2.6 and in line with the finding of [19] that security and quality of land tenure rights directly affect how resources are used and managed. Also, [20] asserts that farm tenure systems in Ghana are complex and changes over time in response to evolving ecological and socio-economic conditions. Fertilizer and pesticide use was significant at 1% and conformed to priori expectation, indicating that adequate and timely application will increase the yield of cocoa farms. According to Appiah et al. [21], the intense cultivation of cocoa on a piece of land reduces soil fertility due to soil nutrient depletion. Fertilizer application can replenish the depleted soil nutrients and increase productivity. Dorman et al. [4] postulate that the incidence of pests and diseases is a major challenge in cocoa production in Ghana.

The negative impact of farmer age on productivity suggests that the more a farmer ages, the more his yield decreases due to the inability to work for prolonged hours [22]. According to Mumuni et al. [23] younger farmers are more likely to develop entrepreneurial abilities than aged ones. Farm age was significant at 5% and negatively influences cocoa production. Binam et al. [24] observed that improved varieties of cocoa trees are productive after four years of planting with increasing yield

Table 3. Access to rural banks credit and constraints

Source of credit	Percentage (%)	No. of farmers (N=350)
1. Rural Bank	34.3	120
2. Money Lenders	0	0
3. Family and Friends	35.7	125
4. Self-Savings	26.6	93
5. Others(lotteries and rentals)	3.4	12
Reasons for failure to secure RCB's credit	**%**	**No. of farmers (N=230)**
1. Collateral Security	64.8	149
2. Average Deposit Required	10.9	25
3. Fixed Income Guarantees	5.2	12
4. Up to Date Farm Records	19.1	44

Table 4. Logistic regression on factors affecting cocoa yield

Variables	Coefficient	Standard error	P-Value
Education	0.411	0.946	0.081
Farm Tenure	0.316	0.819	0.044**
Fertilizer Use	0.829	1.906	0.000***
Farmer Age	-0.524	0.630	0.432
Farm Age	-0.241	0.738	0.042**
Credit	0.443	0.409	0.000***
Extension Service	0.439	0.112	0.005***
Farming Experience	0.329	0.976	0.124
Member of FBO	0.134	0.401	0.163
Natural Disaster	-3.320	0.610	0.026**
Constant	2.373	1.204	0.000***
Prob >Chi^2 = 0.00			
Pseudo R^2 = 0.78			
Adjusted R^2 = 0.75			

*** $p < 0.05$, *** $p < 0.01$*

Table 5. T-table for data on yield along with f-value

Groups	Mean	SD	Mean diff.	SE of mean diff.	F-value	p-value	t-value	p-value
Credit Takers	359.71	42.63	124.40	4.60	8.029	0.371	27.03	0.00
Non-Credit Takers	235.30	39.91						

Table 6. ANOVA for percentage means of bank's credit portfolio allocations

Source of variation	SS	df	Mean square	F value	Sig. (p-Value)
Between groups	2428.290	3	809.430	3.638E3	0.000
Within groups	0.890	4	0.222		
Total	2429.180	7			

until 20 years; then yields start to decline. Access to credit was significant at 1% and has a positive influence on yield supporting the finding that finance is needed to increased agricultural production [7]. Access to agricultural extension services was significant at 1% and positively affects farmers yield, as it tends to provide farmers with crucial information on modern methods of farming. According to Anim-Kwapong et al. [25], cocoa farmers in Ghana are quite conservative and require very effective extension systems to motivate them to adopt new technologies.

3.4 Effect of Credit on Cocoa Yield

The resultant effect of credit on total yield for credit takers and non-credit takers was investigated with the use of a two-sample t-test for independent groups. The computed values of

Table 7. Post-hoc comparison of means using Tukey HSD test

Group	Sample mean	Sample size	
Agriculture 1	6.85	2	
Cottage 2	8.60	2	
Trade and Industry 3	39.20	2	
Others (social) 4	45.35	2	
Comparison	**Mean diff.**	**SE**	**p-value**
Group 1 to Group 2	-1.75000	0.47170	0.067
Group 1 to Group 3	-32.35000	0.47170	0.000*
Group 1 to Group 4	-38.50000	0.47170	0.000*
Group 2 to Group 3	-30.60000	0.47170	0.000*
Group 2 to Group 4	-36.75000	0.47170	0.000*
Group 3 to Group 4	-6.15000	0.47170	0.001*

** The mean difference is significant at 0.05 level*

the t-statistics together with F-test results are presented in Table 5. One assumption for using the two-sample t-test for independent groups is that the variance of the two groups must be homogenous. Hence Levene's F-test was used to test the null hypothesis of equality of variance. From the test results, values of mean, standard deviation and standard error are given. The mean yield of cocoa farmers who used rural banks credit for farming was larger (359.71 $kgha^{-1}$) than non-rural banks credit users (235.30 $kgha^{-1}$). However, whether this difference is significant or not, the t-test was used to make the clarifications. In testing the equality of variance, F value from Lavene's test was 8.029, which is non-significant as the associated p-value is 0.371, which is more than 0.05. Hence the two groups variances were concluded to be homogenous. The value of t-statistics is 27.03 with significant p-value < 0.05. Thus, the null hypothesis of equality of the mean yield of the two groups is rejected and it may be concluded that the cocoa yield of rural credit takers and non-rural credit takers are different.

Finally, to test the hypothesis as to whether the yield of credit takers is greater than that of non-credit takers, a right-tailed test was used. The t value (27.03) was compared with the tabulated $t_{0.05}$ ($N_{1+}N_2$ -2). Hence from the t table for a one-tailed hypothesis, the value of $t_{0.05}$ (348) is 1.649. Since the calculated value of t (=27.03) is greater than tabulated t (=1.649), H_0 may be further rejected, and it may be concluded that the yield of credit takers is significantly higher than that of non-credit takers. Ultimately, these results support the findings of [26,27,28] that rural credit takers have the edge to employ and pay farm labors, purchase fertilizers, insecticides, pesticides, and tri-cycles than non-credit takers, hence the potential for their yield difference. Finally, Essel and Newsome [16] also suggested that modern technologies in agriculture productivity are almost always being associated with increased demand for working and fixed capital. Hence, finance is fundamental to increasing agricultural productivity in developing countries.

3.5 Allocations of Rural Bank's Credit Portfolio

Differences in the means of percentage credit allocations of the two major rural banks in the district are presented in Tables 6 and 7 respectively. This section examines rural banks credit portfolio and its implication on agricultural financing. A credit portfolio refers to the number and types of loans held by lenders [29]. Also, credit portfolio characteristics such as loan terms and cost of loans play a crucial role in lenders decision. Before their setup, Bank of Ghana (BOG) mandated that agricultural loans should represent 50% of any rural banks credit portfolio, 30% for cottage industry and finally 20% for trading. The study of Kadri et al. [10] on the importance of rural banks in Ghana concluded that rural bank's credit lending operations have failed to meet the BOG requirements, hence depriving the agricultural sector of its 50% mandatory sectoral allocation. In this study, it was observed that rural banks credit portfolio comprises of agricultural (6.85%), cottage industry (8.6%), trade (39.2%) and Social loans (45.35%) This suggests that agricultural loans are given less priority by rural banks in terms of loan disbursed. The F value in Table 6 is significant as p-value <0.05, which suggests that the mean percentage portfolio allocations between the selected rural banks were different. To further verify which group means are different in the sample, a *post hoc* test using Tukey was

performed (Table 7). From the Tukey procedure, there is no difference in the average amount of loan disbursed between agriculture and cottage since $p>0.05$. There was a difference in the amount of loan disbursed between agriculture and trade $p<0.05$, between agriculture and social credit, $p<0.05$. Credit disbursed between cottage, trade and social loans were all significant ($p<0.05$) respectively. Since the percentage mean allocation for cottage, trade and social loans are larger than agriculture, it can be concluded that the agricultural sector is treated less favorably. This supports the findings of Essel and Newsome [16] that rural banks have diverted their attention to social and personal loans rather than focusing on farmers, which has ultimately restarted agriculture growth in Ghana.

4. CONCLUSION

This study had the objectives of accessing the effectiveness of rural bank's credit on the yield of rural cocoa farmers, and also comparing their credit portfolio allocations characteristics to the stipulations of bank of Ghana. The result of the findings shows that cocoa farmers who accessed rural credit experienced a significant increase in cocoa output with a mean yield of 359.71 $kgha^{-1}$ as compared 235.30 $kgha^{-1}$ for non-credit takers. The mean difference in cocoa output suggests that rural banks are beneficial and contributing immensely to cocoa farmer's welfare, thus the main reason for their establishment. Concerning credit accessibility, only 34.3% of farmers accessed and utilized credit from the two major rural banks in the district, while other farmers had to rely on other sources of finance because of the stringent procedures required by the banks. Inherently, farm tenure system, fertilizer use, access to credit and access to extension services positively contributed to cocoa output while the age of cocoa farmer, farm age and vulnerability of farm to natural disaster negatively affected cocoa yield. It was further discovered that rural banks were allocating 45.35% of their credit portfolio to social loans, 39.20% to the trading sector and only 6.85% to the agriculture sector; hence, the sector was treated less favorably in this regard. From these findings, it is clear that rural banks have lower outreach which seriously undermines their effectiveness in supporting cocoa farmers. It is therefore relevant that the Bank of Ghana develops a comprehensive system that constantly monitors the credit portfolio allocation of these rural banks. For policy implications, the results from this study will be beneficial to stakeholders and development partners working in the area of cocoa intensification programs in Ghana.

CONSENT

As per international standard informed and written participant consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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