International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Investigating Cocoa Farmers' Perception and Determinants of their Perceptions on Farm Support Services in Ghana

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ABSRACT

This study investigated three institutions that provide support services for cocoa farmers in Ghana. These institutions are: extension, Farmer - Based Organisations (FBOs) and Licenced Buying Companies (LBCs) in three cocoa producing regions of Ghana, namely: Ahafo, Bono and Western North regions. The sample size for the study was seven hundred (700) cocoa farmers; comprising two hundred and fifty (250) cocoa farmers each selected from Ahafo and Western North regions and two hundred (200) cocoa farmers from Bono region. Simple random sampling procedure was employed to interview farmers using structured questionnaires. Five point 'Likert' scale perception index coded from 1-5 ("Strongly Disagree," to "Strongly Agree.") was used to evaluate farmers' perception on support services and the results obtained indicated that the majority of farmers agree to extension and FBO supports. The overall perception index of extension was 3.84 and FBO 3.63 indicating farmers agreement to extension and FBO supports. Farmers were neutral to LBC support (2.87). Multivariate Ordered Probit model was used to determine factors that influence farmers' perceptions on support services. Years of formal education positively influenced extension and FBO supports at 1% level of significance. Household size positively influenced extension support at 1% level whilst negatively influenced LBC service at 10% level of significance.

KEYWORDS: Cocoa farmers, Multivariate, Ordered Probit, Perception, Support Services.

1.0 INTRODUCTION

Productivity Enhancement Programmes (PEP) (mainly artificial hand pollination of farms, mass pruning, cocoa Hi-Tech, cocoa rehabilitation and moribund) have been rolled out by Ghana Cocoa Board (COCOBOD) (Afriyie-Kraft *et al.,* 2020; Buama *et al.,* 2018). However, cocoa yield recorded for 2018/2019 season was 811,250 tonnes compared to a target of 850,000 tonnes (Afriyie-Kraft *et al.,* 2020). Thus, despite all these PEP intervention programmes and farmers' efforts, productivity in the cocoa sector has not improved sufficiently to meet set targets (Agyei-Manu *et al.,* 2020; Ali *et al,* 2018). Yet, several empirical research have uncovered that yield and productivity can be increased through farm support services provided by government, organizations, and private individuals (see, e.g., Danso-Abbeam *et al.,* 2018; Onumah *et al.,* 2014). Farm support services that have been identified in cocoa farming include financial, labour and extension services. Other services are farmer groups and input supply services (Buama *et al.,* 2018; Onumah *et al.,* 2014).

Several empirical papers have identified correlates of farmers' perception on a variety of cocoa-related issues (Buama *et al.*, 2018; Buxton *et al.*, 2020; Ehiakpor *et al.*, 2016; Fesenberg, 2012; Higonnet *et al.*, 2017; Kodom *et al.*, 2022; Onumah *et al.*, 2014; Ehiakpor *et al.*, 2016). For example, Ehiakpor *et al.*, (2016) conducted a study on farmers' perception on climate change variabilities in cocoa farms and found out that farm size, farm management training, household size and farmer-based organization (FBO) membership significantly influenced perceptions of farmers. A study conducted by Buxton *et al.* (2020) identified factors that influence farmers' perception on socio-economic characteristics such as household size and farmer-based organisation (FBO) membership. Studies by Buama *et al.* (2018) and Onumah *et al.* (2014) have shown that access to farm support services like financial assistance and input supply is crucial for increasing cocoa yield. Fesenberg (2012) identified inefficiencies in cocoa production like poor access to quality input and technology. Higonnet *et al.'s* (2017) study on farmers' perception on agroforestry strategies also observed that, the main coping strategies of farmers are the use of fertilizers, plant protection products and shading trees. According to Kodom *et al.* (2022), the perceptions and attitudes of rural Ghanaian youth on cocoa farming and development needs to be changed to encourage them participate in farming activities.

This study investigates cocoa farmers' perceptions and the determinants of their perception on access to farm support services (such as financial assistance and input supply) for policy prescriptions. It focuses on farmers' perception on key service delivery dimensions such as affordability of service, timeliness of service delivery, acceptability of service, reliability of service and availability of service. Other investigated dimensions are responsiveness of service delivery by providers, effectiveness of service and service providers skilfulness. The rest of the paper is organized as follows: section two details the methodology, section three presents the results and discussions, and the conclusion and policy implications of the enquiry are outlined in sections four and five respectively.

2.0 METHODOLOGY

2.1 The Study Area

The study area comprises three regions of Ghana where cocoa farmers abound. The three regions are: Ahafo, Bono and Western North. These regions share boundaries and have similar soil and climate characteristics.

2.1.1 The Ahafo Region

The Ahafo region is a newly created region in Ghana with Goaso as its capital. The region is bordered on the north and west by Bono region, the east by Ashanti region, south by the Western North region and it is made up of seven districts. The region is part of the forest belt of Ghana and has vegetation that consists predominantly of fertile soil and grassland with clusters of drought-resistant trees such as baobabs or acacias. The region is a predominant cocoa producing area with other farming activities such as maize, root and tuber crops production. https://sites.google.com/view/ghanaplacenames-ahafo/home

2.1.2 The Bono Region

The Bono region is one of the sixteen administrative regions of Ghana. With Sunyani as its capital, the region was carved out of the former Brong Ahafo Region. The region shares a border at the north with Savannah Region, bordered on the west by Cote d'Ivoire International border, on the east by Bono East region, and on the south by Ahafo Region. Cocoa production is a prime occupation in the region. https://www.citypopulation.de/en/ghana/admin/07__bono/

2.1.3 The Western North Region

The Western North region is one of the six new regions created in 2019 by the government of Ghana. The region is bounded by Cote d'Ivoire on the west, the Central region in the southeast part, and the Ahafo, Ashanti, Bono and Bono East regions in the northern territory. The Western North region has the highest rainfall in Ghana, lush green hills, and fertile soils. The region is a leading cocoa producer in Ghana. The capital town of Western North region is Sefwi Wiawso. https://yen.com.gh/187124-list-western-north-region-districts-capitals.html.

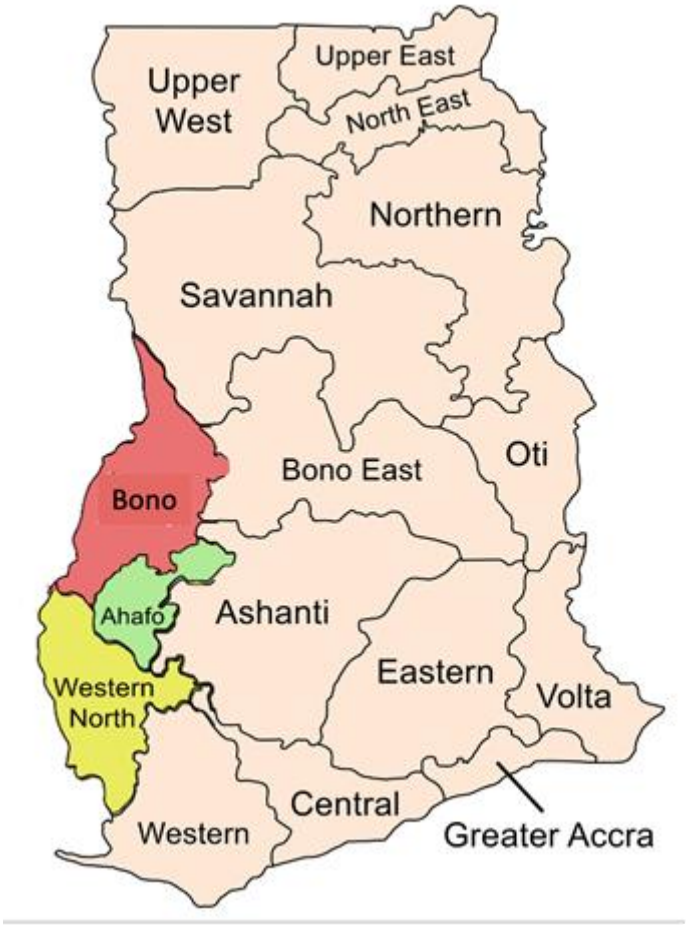


Fig. 1. Map of Ghana showing the study area

2.2 The Population, Sample Size and Sampling Technique

There are over 150,000 thousand cocoa farmers in the study area. The sample size for the study is 700 cocoa farmers, representing a small proportion of the total cocoa farming population in the area. Because the target farmers were dispersed over a wide geographical area, multistage sampling technique was employed in this study. First, purposive sampling was used to select three regions and six districts. Second, simple random sampling was conducted to select eighteen communities (three communities from each district). Third, simple random sampling technique was used to select farmers accessing support services for interview, using structured questionnaires.

2.3 Research Design and Methods of Data Collection

To undertake this cross-sectional correlational study, questionnaires were designed to collect quantitative data from the cocoa farmers in the specified study area. Enumerators were trained to collect

data for processing. Pre-testing of questionnaires was done with trained enumerators to test the accuracy, reliability, clarity and suitability of the research instrument. Validity and consistency of collected data were ensured by adjusting questions from pretested questionnaires for actual data collection.

Data were gathered on farmers' perception on access to farm support services; farmers socio-economic characteristics such as level of education, household size, farming experience, marital status; farm characteristics such as farm size, age of cocoa trees and location of farm; factors that influence farmers access to support services such as prices of inputs, timeliness of service, service quality, responsiveness of service, accessibility and availability of service providers; and the effects of support services on cocoa yield. To enable a comparison of farmers' perception of service delivery across different institutional providers of cocoa support services, farmers' perception were sought on the support services provided by Extension Services, FBOs and Licensed Buying Companies (LBCs). The Cronbach's alpha figures obtained for extension, FBO and LBC were 0.933, 0.981 and 0.974 respectively. Since each Cronbach's alpha was greater than 0.5, the results were valid and reliable. Again, Bartlett's test of sphericity shows that null hypotheses variables are not intercorrelated. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) results obtained indicate sampling adequacy for the data used for perception analysis as shown in Table 1.

Table 1: Validity and Reliability Test

	Number of items	**Cronbach's alpha**	**Bartlett's test of sphericity (H0: variables are not intercorrelated)**	**Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)**
Perception on FBOs	9	0.981	Chi-square =10224.79 Sig. = 0.000; df = 36.	0.939
Perception on extension	8	0.933	Chi-square = 5283.2 Sig. = 0.000; df = 28	0.871
Perception on LBCs	10	0.974	Chi-square = 9869.69 Sig. = 0.000; df = 45	0.942
Overall	***27***	***0.940***	***Chi-square = 27595.15 Sig. = 0.000; df = 351***	***0.893***

Source: Field survey, 2021

2.4 Method of Data Analysis

Descriptive statistics such as bar chart was used to analyse specific support services provided by the institutions, while Multivariate Ordered Probit (MVOP) model was employed to analyse determinants of cocoa farmers' perception. A five-point "Likert" scale perception index, coded from 1 to 5, where 5 = "Strongly Agree", 4 = "Agree", 3 = "Neutral", 2 = "Disagree", and 1 = "Strongly Disagree", was used to analyse overall average perception index of farmers from the three institutions.

2.4.1 Perception Index

Similar to (Buxton *et al.,* 2018), the Perception index was calculated for each statement and the overall index was computed using Equation 2.1:

$$PI = \frac{\sum_{1}^{5} X1-5, f1-5}{N} \qquad 2.1$$

where X=1 (Strongly Disagree), X=2 (Disagree), X=3 (Neutral), X=4 (Agree), X=5 (Strongly Agree), f1-5 = frequency for X_1, X_2, X_3, X_4 and X_5, and N = sample size.

2.4.2 Multivariate Ordered Probit

To assess the factors influencing farmers' perception on multiple support services, MVOP approach was used. This approach acknowledges the interdependence of various support services and captures the ordinal nature of the dependent variable, which reflects farmers' perceptions as "Strongly Disagree", "Disagree", "Neutral", "Agree", or "Strongly Agree". The MVOP model is contingent upon an ordinal dependent variable which is denoted as a latent variable, Y*, theoretically expressed as:

$$Y_i^* = x_i\beta + \varepsilon_i \qquad 2.2$$

where, Y* = qualitative ordinal measure of farmers perception, X and β correspond to vectors of explanatory variables and parameters, respectively. The error term, ε, showcases multivariate normal probability distributions characterized by a mean of zero.

Empirically, the MVOP model was specified as in Equations 2.3, 2.4, and 2.5:

$$Y_1 = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \beta_6\chi_6 + \beta_7\chi_7 + \beta_8\chi_8 + \beta_9\chi_9 + \beta_{10}\chi_{10} + \beta_{11}\chi_{11} + \beta_{12}\chi_{12}$$

or $$Y_1 = \beta_0 + \sum_{i=1}^{12}\beta_i\chi_i \qquad 2.3$$

$$Y_2 = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \beta_6\chi_6 + \beta_7\chi_7 + \beta_8\chi_8 + \beta_9\chi_9 + \beta_{10}\chi_{10} + \beta_{11}\chi_{11} + \beta_{12}\chi_{12}$$

or $$Y_2 = \beta_0 + \sum_{i=1}^{12}\beta_i\chi_i \qquad 2.4$$

$$Y_3 = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \beta_6\chi_6 + \beta_7\chi_7 + \beta_8\chi_8 + \beta_9\chi_9 + \beta_{10}\chi_{10} + \beta_{11}\chi_{11} + \beta_{12}\chi_{12}$$

or $$Y_3 = \beta_0 + \sum_{i=1}^{12}\beta_i\chi_i \qquad 2.5$$

where Y_1, Y_2, and Y_3 represent the perception of farmers on support services from extension, LBCs and FBOs respectively, and the explanatory variables and the apriori expectations of their coefficients are specified in Table 2.

Table 2: ''Apriori'' Expectation of Determinants of Farmers' Perceptions

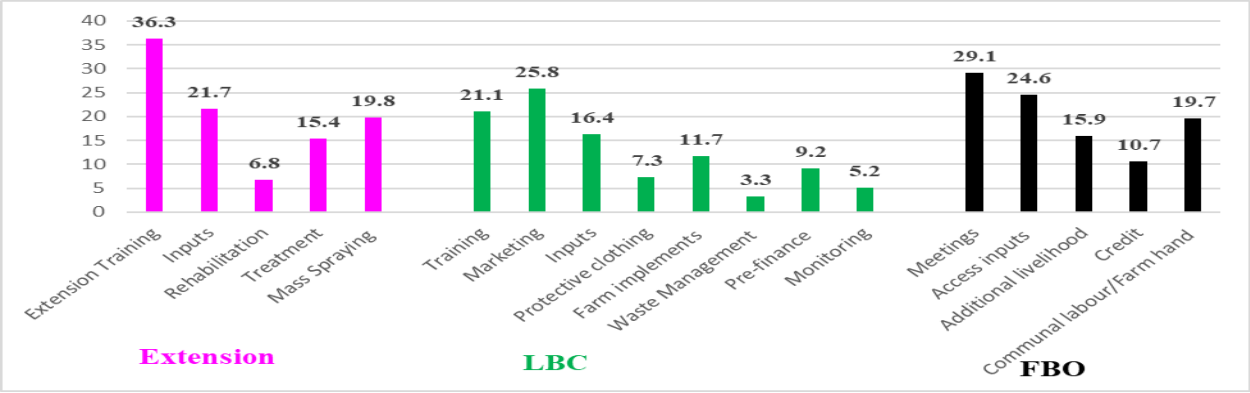
Variables	Measurement	Extension	FBO	LBC	References
Age (x_1)	Years	-	-	-	(Adiyah *et al.*, 2021); (Ingram *et al*, 2018)
Gender (x_2)	Binary; 1 = Male; 0 = Female	+/-	+/-	+/-	(Agwu *et al.*, 2018)
Education (x_3)	Years in formal education	+	+	+	(Adiyah *et al.*, 2021); (Beer *et al*, 2021)
Household size (x_4)	Continuous; Number of people	+	+	+	Agwu *et al.*, 2018

Farming experience (x_5)	Number of years in farming	+/-	+	+/-	(Ingram *et al*, 2018); (Beer *et al*, 2021)
Farm size (x_6)	Continuous; acres	+	+	+	(Agwu *et al.*, 2018); (Beer *et al*, 2021)
Farm age (x_7)	Binary; 1 = More than 5 years; 0 = Otherwise	+	+	+	(Ingram *et al*, 2018)
FBO membership (x_8)	Binary; 1 = Yes; 0 = No	+	+	-	(Adiyah *et al.*, 2021)
Access Extension services (x_9)	Binary; 1 = Yes; 0 = No	+	-	-	(Adiyah *et al.*, 2021)
Access to credit (x_{10})	Binary; 1 = Yes; 0 = No	+/-	+/-	+/-	(Agwu *et al.*, 2018); (Beer *et al*, 2021)
Access input supplies (x_{11})	Binary; 1 = Yes; 0 = No	-	-	-	(Agwu *et al.*, 2018)
Rerseach & Dev (x_{12})	Binary; 1 = Yes; 0 = No	+	+	+	(Adiyah *et al.*, 2021)

3.0 RESULTS AND DISCUSSIONS

3.1 Specific support services from the three institutions

Figure 2 depicts various services the three institutions offer in the three regions. Extension provides extension training, inputs such as fertilizers and rehabilitation of cocoa farms. The LBCs also offer marketing, training and pre-finance. FBOs support farmers with inputs, additional livelihood such as beekeeping and mushroom production. The highest service provided by extension, LBCs and FBOs is extension training, marketing service and meetings respectively.



Source: Field survey, 2021

Fig. 2. Specific support services from the three institutions

3.2 Perception of farmers on the three support institutions

Table 3 reports the results for the computed perception index from farmers' responses to questions on the services provided by the three institutions. The perception index for extension was 3.84 (i.e., approximately 4), indicating that farmers in the three regions agree to the extension support statements. Similarly, from a score of 3.63 (again roughly 4), farmers agreed to FBO support services statements. Farmers remained neutral (2.87) to LBCs services. The overall perception index for all three institutions

was 3.45 which shows that, on the average, farmers agreed to the perception statements for all the three support service providers.

Table 3: Perception of farmers on the three support service providers

STATEMENT	EXT	FBO	LBC
Affordability of service	3.79	3.60	2.25
Timeliness of service delivery	3.76	3.78	3.17
Acceptability of service	3.78	3.58	2.32
Reliability of service	4.08	3.68	3.10
Availability of service	4.00	3.78	3.32
Responsiveness of service delivery	3.79	3.43	3.11
Effectiveness of service	3.75	3.57	3.37
Service providers are skilful	3.77	3.62	2.30
Perception Index	**3.84**	**3.63**	**2.87**
Overall Perception Index	**3.45**		

Source: Field data, 2021

It is noteworthy that, apart from 'timeliness of service delivery' for which farmers' had a higher perception on FBO services than that from extension services (3.78 vs. 3.76), farmers' perception on all other dimensions of support service delivery by extension was higher than those of both FBOs and LBCs. Similarly, farmers' perception on all dimensions of support service delivery by FBOs was higher than that of LBCs. Overall, these results are generally representative of region-specific patterns.

3.3 Determinants of farmers' perception on the three support institutions

Table 4 shows results of the MVOP model estimates for the determinants of cocoa farmers' perception of support service delivery by the three institutions. Age of a farmer was identified to negatively influence both extension and FBO support at 5% significant level. This confirms Adiyah *et al.* (2021) as well as Ingram *et al.'s* (2018) findings depicted by Table 2. Years of formal education positively influence extension and FBO supports at 1% significant level. This supports Adiyah *et al.'s* (2021) finding. Years of farming positively influence extension and FBO services at 1% significant level. This aslo comfirms Ingram *et al.* (2018) and Beer *et al.'s* (2021) findings. Household size positively influenced extension support at 1% level whilst negatively influenced LBC service at 10% level of significance. This also affirms Agwu *et al.'s* (2018) assertion on extension while the result for LBC contradicts their assertion. Age of farm negatively influences extension at 1% level of significance. Engagement in other economic activities also known as divestification influences extension and FBO supports positively at 1% level while affecting LBC support negatively at 1% level. Access to input supply has a positive effect at extension at 1% level. Access to credit support positively influences FBO services at 1% level of significance. Distance to farm support negatively influences extension and LBC supports at 5% and 1% levels respectively. Access to research and development services positively influences LBC support at 1% level.

Table 4: Multivariate Ordered Probit Model Estimates for determinants of farmers' perception on the three support institutions

Variables	Extension		LBC		FBO	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
Age	-0.012**	0.005	0.001	0.005	-0.013**	0.005
Gender	0.036	0.093	-0.188**	0.09	-0.099	0.092
Years of formal education	0.121***	0.031	0.009	0.03	0.107***	0.031
Household size	0.034***	0.012	-0.022*	0.012	0.01	0.012
Years of farming	0.019***	0.004	0.004	0.004	0.022***	0.004
Farm size	-0.035	0.102	-0.107	0.099	0.043	0.101
Farm age	-0.576***	0.147	0.004	0.139	-0.094	0.141
Engaged in other economic activity	0.763***	0.12	-0.514***	0.116	0.799***	0.12
Access input supply	0.842***	0.153	-0.027	0.149	0.159	0.151
Access to credit	0.020	0.094	0.10	0.091	0.533***	0.094
Distance to farm support service (km)	-0.308**	0.147	-0.386***	0.144	-0.461***	0.146
Access research services	-0.144	0.111	0.46***	0.109	0.014	0.11
Goodness of fit						
/cut_1_1	*-2.213****	*0.377*	*/cut_3_2*	*0.679***	*0.334*	
/cut_1_2	*-0.61**	*0.338*	*/cut_3_3*	*1.405****	*0.339*	
/cut_1_3	*0.053*	*0.337*	*/cut_3_4*	*3.028****	*0.351*	
/cut_1_4	*1.578****	*0.343*	*/atanhrho_12*	*0.019*	*0.047*	
/cut_2_1	*-1.681****	*0.331*	*/atanhrho_13*	*0.548****	*0.051*	
/cut_2_2	*-0.714***	*0.327*	*/atanhrho_23*	*0.081**	*0.047*	
/cut_2_3	*0.436*	*0.329*	*rho_12*	*0.019*	*0.047*	
/cut_2_4	*1.838****	*0.38*	*rho_13*	*0.499*	*0.038*	
/cut_3_1	*0.418*	*0.335*	*rho_23*	*0.081*	*0.047*	

****** denotes 1% level , ** denotes 5% level and * denotes 10% level of significance***

Source: Field Data, 2021

4.0 CONCLUSIONS

Farmers in the study area agreed to extension (3.84) and FBO (3.63) support services while remaining neutral to LBC (2.87) support services. Apart from 'timeliness of service delivery' for which farmers' had a higher perception on FBO services than that from extension services (3.78 vs. 3.76), farmers' perception on all other dimensions of support service delivery by extension was higher than those for both FBOs and LBCs. Similarly, farmers' perception on all dimensions of support service delivery by FBOs was higher than that of LBCs.

Factors identified to have significant influence on farmers' perception were age of farmers, years of formal education, FBO membership, years of farming and household size. Age of a farmer was identified to negatively influence both extension and FBO support services at 5% significant level. Years

of formal education positively influenced extension and FBO supports at 1% significant level. Years of farming positively influenced extension and FBO services at 1% level. Household size positively influenced extension support at 1% level whilst negatively influenced LBC service at 10% level of significance.

5.0 RESEARCH AND POLICY IMPLICATION

Extension and FBO supports were appreciated by the farmers in the study area hence farmers must be motivated to participate in extension and FBO activities. Farmers who are not affiliated to any FBOs should be encouraged to join FBOs, to enable them access FBO support. LBCs must improve their services to be appreciated by farmers in the area.

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