



## Cocoa Extension Public-Private Partnership in Ghana: A New Path for Rural Development

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### ABSTRACT

After many decades, the cocoa industry opened up to various partnerships to enhance its activities and essentially chart a new path toward rural development. This paper used a descriptive survey design to assess farmers' perception of the Cocoa Extension Public-Private Partnership (CEPPP). We selected 400 cocoa farmers and analyzed the data using descriptive and inferential statistics. Farmers expressed positive perceptions of the CEPPP and all investigated attributes. Farmers were also satisfied with the quality of extension services provided under the CEPPP. Age, education level, cooperative membership, household size, gender, access to extension and credit services, land ownership, and farm size influenced farmers' perceptions. Cocoa farmers need to be made aware of the full range of services offered by the CEPPP through targeted campaigns and training programs. Since most of these services are free, farmers can take advantage of them to improve their livelihoods.

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## Introduction

The agriculture sector is a crucial means of supporting livelihoods in developing nations, with a significant portion of the population relying on it either directly or indirectly. Enhancing agriculture in these areas is crucial to improve the conditions of the people (Ismail & Azzahra, 2014). Cocoa, the mainstay of Ghana's economy, is cultivated in the Eastern, Ashanti, Brong Ahafo, Volta, Central and Western North and South Regions. About 850,000 farm families spread over these cocoa regions of Ghana are believed to be involved in cocoa farming and its related activities. The crop generates about \$2 billion in foreign exchange annually and a major contributor to the country's Gross Domestic Product (GPD) (COCOBOD, 2023). The importance of agricultural extension in achieving self-sufficiency is also undeniable, however, public extension on its own has proven insufficient to meet the needs of farmers due to various challenges such as limited resources and unfavorable farmer-to-extension ratio. To overcome these limitations, it is essential to take a comprehensive approach that involves private and government organizations. Information sharing through public-private partnership (PPP) can also improve global agriculture by facilitating the exchange of practical agricultural information and promoting the cultivation of best practices among all parties (Sulaiman & Van Den Ban, 2003).

Public-private partnership (PPP) in agriculture offers a chance to introduce new technologies and products that benefit small farmers and marginalized communities in developing countries (Saravanan & Veerabhadraiah, 2003). This arrangement is a long-term cooperation with 51% or more equity held by the private partner(s), aimed at creating and managing infrastructure for public use for a specified period on commercial terms through an open procurement process (Nanda, 2015). It alleviates the shortage of public resources, fosters competitiveness, reduces risk, helps improve efficiency, accelerates implementation, and lowers life cycle costs. The government entices the private sector, leading to enhanced operations, more effective resource management, access to cutting-edge technology, and better project design. The government makes use of the private sector's innovative potential to obtain finance (Madenovic et al., 2013).

PPP have gained popularity in recent decades as a means of addressing complex and difficult governance issues (Sulaiman and Van Den Ban, 2003). The Cocoa Extension Public-Private Partnership (CEPPP) is a unique PPP model, specifically designed to improve the delivery of cocoa extension services in Ghana. The model involves a close collaboration between the government of Ghana, the private sector, and farmer-based organizations (FBOs), with the aim of promoting technology transfer and improving the competitiveness of the cocoa sector. The focus is on providing quality extension services that are relevant, cost-effective, and accessible to farmers. It also seeks to provide cost-effective and efficient extension services to farmers and help them view cocoa farming as a profitable business. The new system has been designed to ensure that farmers are at the center of the extension process, with the expectation that they will be active participants in the services provided and will have a say in the design and implementation of extension activities. The success of CEPPP will depend on the active participation of farmers, the effective collaboration between the public and private sectors, and the ability of the system to respond to the changing needs of farmers in the cocoa sector (Srinath & Ponnusamy, 2011).

The CEPPP offers a range of services aimed at improving the productivity, income, and livelihoods of cocoa farmers. These services include technical assistance in areas such as disease control, farm rehabilitation, replanting, and quality control measures.

The partnership also trains and educates farmers, provide scholarships to farmers' wards, and supports FBOs and the community at large. Partners from the public sector include COCOBOD while farmers, WCF/CLP, Armajaro Ghana Limited, Mondelez (Cadbury), Solidaridad West Africa, and the Rainforest Alliance are the partners from the private sector. These partners help pay for the hiring, paying, and training of extension agents, as well as the provision of publications, training materials, and farmer training expenses. Additionally, GIZ-Sustainable Cocoa Business collaborates with the other partners to provide farmer business school training. Currently, the Cocoa Extension Public-Private Partnership is working in the Western North region with Cargill and Mondelez as partners (CEPPP).

According to Scharle (2002), the involvement of organizations and industries working together and employing their public and private resources is essential for Public-Private Partnerships (PPP) to be successful. PPP has improved a variety of areas, including social mobilization, economic empowerment, market connections for agricultural products, capacity building for farm families, and lowering risks and uncertainty (Hisrich and Peters, 2002). Numerous cases all over the world prove that PPPs are good. Khush (2005) showed that the commercialization of Bt maize varieties was successful thanks to a collaboration between the Pioneer Hi-Bred Company and the Agricultural Genetic Engineering Institute (AGERI) in Egypt. Srinath and Ponnusamy (2011) indicated that PPPs are necessary to activate group dynamics among communities and improve social linkages. In order to produce and sell maize through PPP and benefit tribal men and women, a producer group was established in the Khurda area of Odisha in 2011. PPP can also help eliminate social discrimination and injustices (Ramasundaram et al., 2011). The utilization of PPP in service delivery provides opportunities for female entrepreneurs and community organizations to offer local services and empower the community (Rajendran et al., 2010). Through PPP between Kudumbhasree Project Mission, the Department of Agriculture, and the Nadukkora Agro-processing center, the Thirumadhuram Pineapple Project in Kerala produced 25,000 tonnes of pineapple and directly employed 12,500 women (Rajendran et al., 2010).

Although a plethora of studies could be spoken of in relation to extension activities in PPP, the majority of the research has been devoted to analyzing success factors from sectoral (Meng et al., 2011; Jamali, 2004), geographical (Cheung et al., 2012; Babatunde et al., 2012), and project phase (primarily feasibility and planning) perspectives. Others tended to concentrate on the full lifetime of PPP projects without specifically examining the operational phase success determinants. Research conducted by Klerkx and Leeuwis (2008) revealed that PPPs can foster collaboration between different stakeholders in the cocoa industry, thus promoting the sharing of best practices and resources to improve cocoa production and increase farmer incomes. In India, Singh et al. (2015) found that farmers had a mixed perception of PPPs, with some farmers expressing concerns about the quality of inputs provided by private sector partners. In Pakistan, Tahir et al. (2016) found that farmers had limited awareness of PPPs. In Nigeria, Amamchukwu et al. (2020) and Oluwole et al. (2019) focused on the role of the private sector in providing extension services. In Ethiopia, Amelework (2018) explored farmers' perceptions of PPPs in extension service provision and found that farmers were generally satisfied with the extension services provided by PPPs. Only a few studies have been conducted in Ghana to assess the effectiveness of private-public partnerships for agricultural extension activities (Amanor & Farrington, 1991; Gyasi, 2020).

This presents a significant gap that needs to be filled. It is on these premises that this study seeks to assess farmers' perception about public-private partnerships in agricultural extension delivery among Cocoa farmers in the Sefwi Bekwai and Boako districts in Western North Region. The specific objectives are; 1) to assess farmers' awareness of the CEPPP services 2) to assess farmers' perception about the suitability of PPP extension delivery services, 3) to assess farmers' preferred attributes of an improved PPP extension service delivery, 4) to examine how satisfied cocoa farmers are with the quality of services delivered by Public Private Partnership in extension delivery and, 5) to determine the socio-economic factors influencing farmers' perception on suitability, preference and satisfaction.

The perception of farmers towards public-private partnership (PPP) in agricultural extension delivery is crucial in understanding the effectiveness of PPPs in improving agricultural outcomes. This is because it can influence their participation in extension services and the overall success of PPPs. Knowledge of the performance of PPP in extension service could help the cocoa industry players gain valuable information to shape policies and programs to enhance the standard of living of rural people and thereby reduce poverty and improve rural livelihood. The study will make vital contributions to the literature on assessing farmers' perceptions of the CEPPP, hence bridging the existing literature gap.

The importance of understanding farmers' perceptions towards Public-Private Partnerships (PPPs) in agricultural extension delivery lies in its direct impact on the effectiveness and success of such partnerships. Farmers' attitudes and participation in extension services are significantly influenced by their perceptions of PPPs. This study holds crucial value as it provides insights into the performance of PPPs in extension services specifically within the cocoa industry. The findings will offer industry stakeholders, policymakers, and program designers valuable information to tailor initiatives that enhance rural livelihoods, alleviate poverty, and contribute to overall socio-economic development. Bridging the existing literature gap on farmers' perceptions of Cocoa Extension Public-Private Partnerships (CEPPP) ensures that future initiatives are well-informed, responsive, and better aligned with the needs and expectations of the farming community.

## Methodology

The study was carried out in the Sefwi Wiawso and Bibiani-Anhwiaso-Bekwai Municipality of the Western North Region of Ghana. The Sefwi Wiawso Municipal is one of the 261 Metropolitan, Municipal, and District Assemblies (MMDAs) located in Ghana. It encompasses an area of 994 square kilometers. The Municipality shares its boundaries with the Bibiani Anhwiaso Bekwai Municipal to the east, the Bodi District to the west, the Asunafo South District in the Ahafo Region to the north, and the Aowin Municipal to the south. As of the 2021 population and housing census, the Municipality's population stands at 151,220, comprising 75,905 males and 75,315 females. Sefwi Wiawso Municipality is primarily inhabited by cocoa farmers, with a small portion also growing crops such as cassava, maize, rice, and raising farm animals. The Municipality boasts a total of 17,747 farmers and a productive cocoa area of 16,926.75 hectares. The Bibiani-Anhwiaso-Bekwai Municipality is primarily composed of cocoa farmers, with a minority of farmers growing other cash crops and raising farm animals. The current population of the Municipality in 2017 was considered to be 137,084. As a result, the population distribution among males and females was as follows: the male population accounted for 49.4% with a count of 68,929, while the



female population constituted 50.6% with a count of 70,603. Farming is the predominant economic activity in the Municipality, distinguishing it from other regions where farming tends to be predominantly carried out by the elderly. In this Municipality, individuals of all age groups actively engage in farming due to the significant profitability, particularly through cocoa production. Additionally, the Municipality cultivates various other important cash crops such as coffee, oil palm, rubber, citrus, black pepper, and coconut.

This study employed a quantitative research approach. The descriptive design aimed to identify the current state of a phenomenon under investigation. According to Gay (1987), descriptive research is useful in providing reliable insights into the current status of a phenomenon. This design was particularly relevant for this study as it sought to understand the current state of extension service delivery in the cocoa sector. Cocoa farmers who are beneficiaries of the CEPPP programme within the two municipalities were the population of the study. Since the sampling frame is known, the Yamane (1967) formula was employed for calculating the sample size. Therefore, the calculated sample size is 381. However, it was increased to 400 to house any design effects that may have occurred.

A multistage sampling technique was used to select the respondents. In the first stage, the two municipalities i.e., Sefwi Wiawso and Bibiani-Anhwiaso-Bekwai in the western north region were purposively selected. This is because CEPPP runs in only these two municipalities in the region. Simple random sampling was used in the second stage to select 10 communities from each of the two municipalities and finally, the 400 respondents were selected proportional to the total farmers in each of the selected communities.

In this study, information pertaining to the research goals was gathered using primary data aided by a structured questionnaire. To evaluate the questionnaire's clarity and prove its validity, a pilot study was conducted on 30 cocoa farmers in the study area. This aided in the questionnaire's improvement before it was used to collect data from the research population. Cronbach's alpha was used to test the reliability of the questionnaire. Cronbach's alpha obtained was above 0.7 for the suitability, preference and satisfaction statements. This indicates questionnaire passed the reliability test. The Kaiser-Meyer-Olkin (KMO) value of Bartlett's sphericity test and factor loading coefficient was used to test the validity of the questionnaire. The results of the validity test showed that the KMO value was 0.737, the KMO value of each subscale was higher than the ideal level of 0.7, and the Bartlett's sphericity test was significant at the 1% level. In addition, the factor loading coefficient of each observed variable was higher than 0.6, indicating that the questionnaire had good structural validity. Therefore, the questionnaire passed the validity test. Data was analyzed using frequency, percentages, means, standard deviations, and multivariate probit model aided by Stata.

Farmers awareness were assessed for each individual using a scoring system (1 for aware and 0 for not aware). Frequency and mean were used to analyse the data. To measure farmers' perception, a 3-point Likert scale i.e., 1-disagree, 2-neutral, 3-agree was used. The data was analysed using mean and standard deviation. In measuring farmer preference, a 3-point likert scale i.e., 1-not preferred, 2-neutral, 3-preferred was used. Mean and standard deviation were used for analysis. Satisfaction was measured by using a 3-point Likert scale i.e., 1-dissatisfied, 2-neutral and 3-satisfied. Data was analyzed using mean and standard deviation.

In this study, the multivariate probit (MVP) model, as suggested by Oyetunde-Usman (2021), was employed to examine the socio-economic factors influencing farmers'

perception of suitability, preference, and satisfaction. This is because it enables the simultaneous estimation of multiple correlated binary outcomes. This approach allows for the consideration of potential correlations between factors that may not be directly observed in perception decisions (Greene and Hensher, 2010). The MVP model accommodates unobservable factors influencing farmers' perception decisions by incorporating correlation among the error terms of latent equations (Belderbos et al., 2004). This correlation accounts for both positive correlation (complementarity) and negative correlation (substitutability) between specific perception decisions. The MVP model is expressed as follows:

$$Y_{ij}^* = W_{ij}\beta_j + \varepsilon_{ij}; j = 1, 2, 3. \quad (1)$$

In equation (1), where  $j = 1, 2, 3$  represents farmers' perception of suitability, preference, and satisfaction, respectively.  $W_{ij}$  represents the independent variables,  $\varepsilon_{ij}$  represents the disturbance term, and  $\beta_j$  represents the coefficients to be estimated. The equation assumes that for a rational  $i$ th farmer, a latent variable ( $Y_{ij}^*$ ) captures factors that are not directly observed but are associated with the  $j$ th preference.

The latent variable  $Y_{ij}^*$  considers both observed ( $W_{ij}$ ) and unobserved factors (captured by the disturbance term  $\varepsilon_{ij}$ ) that influence the  $j$ th perception, assuming a linear combination. To transform the unobserved choice into an observed binary outcome equation for each strategy, the indicator function is utilized. This computation is based on the observable binary discrete variables  $Y_{ij}$ , which indicate whether a farmer has a particular perception or not. The equation specifying this transformation for each strategy is as follows:

$$Y_{ij} = \begin{cases} 1 & \text{if } Y_{ij}^* > 0 \\ \vdots & \\ 0 & \text{if } Y_{ij}^* \leq 0 \end{cases} \quad (2)$$

Given the possibility of multiple perceptions being adopted, the error terms in Equation 1 are assumed to follow a multivariate normal (MVN) distribution with a zero conditional mean and variance normalized to unity. Thus  $\varepsilon_{ij} \sim MVN [0, \Sigma]$  and covariance matrix ( $\Sigma$ ) specified as:

$$\begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \\ \varepsilon_{3i} \\ \vdots \end{pmatrix} \sim \begin{pmatrix} 1 & \rho_{12} & \rho_{13} & \dots & \rho_{17} \\ \rho_{21} & 1 & \rho_{23} & \dots & \rho_{27} \\ \rho_{31} & \rho_{32} & 1 & \dots & \rho_{37} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \rho_{71} & \rho_{72} & \rho_{73} & \dots & 1 \end{pmatrix} \quad (3)$$

By utilizing Equation (3) and making certain assumptions, we can develop a multivariate probit (MVP) model that effectively captures the decisions associated with the adoption of adaptation strategies. This particular model accounts for non-zero off-diagonal elements, enabling the correlation between the disturbance terms of multiple latent equations. These equations relate to the unobserved characteristics that influence farmers' perceptions. Thus, the MVP model allows us to collectively analyze and understand the interrelationships among these strategies in the decision-making process.

## Results and Discussion

### Socio-economic characteristics

**Table 1.** Descriptive Statistics of Respondents

| Variables                   | Frequency | Percentage (%) |
|-----------------------------|-----------|----------------|
| Sex of Respondent           |           |                |
| Female                      | 159       | 39.75          |
| Male                        | 241       | 60.25          |
| Age of Respondent (years)   |           |                |
| 18-28                       | 6         | 1.5            |
| 29-38                       | 38        | 9.5            |
| 39-48                       | 153       | 38.25          |
| 49-58                       | 137       | 34.25          |
| ≥ 59                        | 66        | 16.5           |
| Marital Status              |           |                |
| Married                     | 329       | 82.25          |
| Unmarried                   | 71        | 17.75          |
| Level of Education          |           |                |
| No formal Education         | 67        | 16.75          |
| Primary                     | 53        | 13.25          |
| JHS/Middle School           | 214       | 53.5           |
| SHS                         | 39        | 9.75           |
| Tertiary                    | 27        | 6.75           |
| Access to Extension Service |           |                |
| No                          | 11        | 2.75           |
| Yes                         | 389       | 97.25          |
| Cooperative Membership      |           |                |
| Yes                         | 321       | 80.25          |
| No                          | 79        | 19.75          |
| Access to Credit            |           |                |
| Yes                         | 181       | 45.25          |
| No                          | 219       | 54.75          |
| Ownership of Land           |           |                |
| Yes                         | 98        | 24.50          |
| No                          | 302       | 75.50          |
| Farm Size (acres)           |           |                |
| < 3                         | 238       | 59.50          |
| 3-5                         | 81        | 20.25          |
| > 5                         | 81        | 20.25          |

Source: Field Data, 2022

In table 1, there are 39.79% women among cocoa producers compared to 60.25% men. The high proportion of men is explained by the fact that most men in the research region are family heads, in charge of the household members and its productive resources, including land and tree crops like cocoa. The cocoa producers' age ranges were 18–28, (1.5%), 29–38 (9.5%), 39–48 (38.25%), 49–58 (34.25%) and 59 and above (16.5%). This indicates that there are more working-age individuals in the cocoa-growing region than there are inactive individuals. It is a sign of a capable and resilient labor force for long-term, sustainable cocoa production in the research region. Aneani et al., (2011) study support the idea that farmers' aging may have an impact on the quantity of cocoa produced.

The results reveal that 82.25% of the farmers were married. Since cocoa cultivation is known to be labor-intensive and confirms that producers typically rely on family members to help on their fields, married couples make up a greater percentage of cocoa

farmers. This supports 2005 research by the International Institute of Tropical Agriculture (IITA) which identified the family unit as Ghana's main source of labour. The majority of respondents (333) have some level of education, which could be a factor in their willingness to adopt new technologies and practices in cocoa production. This suggests that extension programmes and services targeted towards these farmers may have a higher likelihood of success in promoting improved cocoa production and adoption of certification programs. Additionally, the higher levels of education among the farmers indicate a potential for increased understanding and engagement in extension services offered by the PPP program. The results show that 2.75% of the respondents do not have access to extension services while 97.25% have access. The majority of the respondents benefit from extension education. A significant majority (80.25%) of cocoa farmers in the community were affiliated with cooperatives, suggesting that cooperatives play a vital role in the cocoa farming sector (Acheampong et al., 2023). From the results, 45.25% of the respondents had access to credit. A considerable majority of the survey respondents (75.5%) do not possess land, which suggests that respondents do not have control over their farming operations.

#### **Awareness of types of services provided by CEPPP**

Table 2 presents the results of a survey on the awareness of the types of services provided by CEPPP. The table includes the frequency and percentage of respondents who were aware of each type of CEPPP service.

**Table 2.** Awareness of types of services provided by CEPPP Programme (Multiple responses)

| Types of CEPPP Services          | Frequency | Percent |
|----------------------------------|-----------|---------|
| Cocoa rehabilitation             | 338       | 84.5    |
| Farmer training                  | 206       | 51.5    |
| Cocoa seedling supply            | 67        | 16.8    |
| Facilitating farmer cooperatives | 79        | 19.8    |
| Pollination                      | 396       | 99.0    |
| Mass pruning                     | 393       | 98.3    |
| CODAPEC/Hi-Tech                  | 400       | 100.0   |

Source: Field Data, 2022

Results from Table 2 shows that about 84.5% of the respondents were aware of cocoa rehabilitation services provided by the CEPPP. This indicates a high level of awareness among the respondents. The table shows that 51.5% of the respondents were aware of farmer training services offered by the CEPPP. While this is a lower percentage compared to cocoa rehabilitation, it still represents a significant portion of the respondents. Only 16.8% of the respondents reported awareness of cocoa seedling supply services provided by the CEPPP. This suggests that there is relatively lower awareness of this particular service compared to others. About 19.8% of the respondents were aware of the CEPPP's services related to facilitating farmer cooperatives. Similar to the cocoa seedling supply, the awareness level for this service appears to be comparatively lower. The data shows that a substantial majority of respondents (99.0%) were aware of pollination services offered by the CEPPP. This indicates a high level of awareness among the respondents. Similarly, 98.3% were aware of mass pruning services provided by the CEPPP. All (100%) respondents were aware of CODAPEC/Hi-Tech services offered by the CEPPP. This indicates complete awareness among the surveyed individuals for this specific service. CEPPP varied in terms of their recognition among the respondents. While some services, such as Cocoa rehabilitation and CODAPEC/Hi-Tech, were highly acknowledged, others, like facilitating farmer



cooperatives, had lower levels of awareness. These findings provide insights into the familiarity of the surveyed population regarding different types of services offered by the CEPPP.

### Farmers' perception of the suitability of extension delivery

Table 3 presents the farmers' perception about the suitability of extension delivery in the CEPPP.

**Table 3.** Farmers perception about the suitability of extension delivery in the CEPPP

| Variables                                        | Disagree (1) | Neutral (2) | Agree (3)   | Mean | SD   |
|--------------------------------------------------|--------------|-------------|-------------|------|------|
| Farm visit                                       | 1 (0.3%)     | 9 (2.2%)    | 390 (97.5%) | 2.97 | 0.17 |
| Home visit                                       | 1 (0.3%)     | 5 (1.3%)    | 394 (98.5%) | 2.98 | 0.18 |
| Transport for CEA (Motorbike)                    | 17 (4.3%)    | 72 (18.0%)  | 311 (77.7%) | 2.73 | 0.13 |
| Farm advisory service                            | 1 (0.3%)     | 37 (9.2%)   | 362 (90.5%) | 2.90 | 0.9  |
| Proximity of farmer to extension agent           | 5 (1.3%)     | 45 (11.3%)  | 350 (87.5%) | 2.86 | 0.06 |
| Extension agent-farmer relation                  | 1 (0.3%)     | 26 (6.5%)   | 373 (93.2%) | 2.93 | 0.03 |
| Availability of efficient inputs (agrochemicals) | 8 (2.0%)     | 92 (23.0%)  | 300 (75.0%) | 2.73 | 0.13 |
| Supply of inputs to farmers                      | 6 (1.5%)     | 78 (19.5%)  | 316 (79.0%) | 2.77 | 0.07 |
| Responsiveness of agents                         | 1 (0.3%)     | 69 (17.2%)  | 330 (82.5%) | 2.82 |      |
| Overall mean                                     |              |             |             | 2.85 |      |

Source: Field data, 2022

Based on table 3, the majority of farmers had a positive perception of the various aspects of extension delivery. For the "Farm visit" (Mean= 2.97) and "Home visit" (Mean= 2.97), the overwhelming majority of respondents agreed with the suitability of these methods, with agreement percentages of 97.5% and 98.5%, respectively. This indicates that farmers found value in receiving extension services through direct visits to their farms or homes. Factors such as the proximity of farmers to extension agents (Mean= 2.90) and the extension agent-farmer relationship (Mean= 2.93) also garnered positive responses, with agreement percentages of 87.5% and 93.2% respectively. This suggests that farmers saw these factors as important for effective extension delivery. Regarding the availability of efficient inputs (agrochemicals) (Mean= 2.73), 75.0% of respondents agreed. Similarly, for the supply of inputs to farmers (Mean= 2.77), 79.0% agreed. These results indicate that most farmers recognized the significance of having access to quality inputs for their cocoa production. Finally, the suitability index, which represents the overall perception of extension delivery, is given as 2.85. This suggests that, on average, farmers perceived the extension delivery methods in the CEPPP to be relatively suitable. The finding agrees with Sennuga et al., (2020) who argue that the role of extension services in the dissemination of accurate information to farmers cannot be underrated. Farmers generally perceived extension delivery methods in the CEPPP as suitable. Farm visits, home visits, farm advisory services, proximity to extension agents, and extension agent-farmer relations received high levels of agreement. However, there were slightly lower levels of agreement for aspects such as transport for CEA and the availability of efficient inputs.

### Farmers preferred attributes of an improved CEPPP extension service delivery

Table 4 presents farmers' preferred attributes of an improved CEPPP extension service delivery.

**Table 4.** Farmers preferred attributes of an improved CEPPP extension service delivery

| Variables                                                                | Preferred (3) | Neutral (2) | Not Preferred (1) | Mean | SD   |
|--------------------------------------------------------------------------|---------------|-------------|-------------------|------|------|
| Regular farm visits                                                      | 306 (76.5%)   | 79 (19.8%)  | 15 (3.7%)         | 2.72 | 0.12 |
| Regular home visit                                                       | 301 (75.2%)   | 81 (20.3%)  | 18 (4.5%)         | 2.70 | 0.29 |
| Provision of farm advisory services                                      | 326 (81.5%)   | 59 (14.7%)  | 15 (3.7%)         | 2.77 | 0.18 |
| Quick response from CEA                                                  | 304 (76.0%)   | 83 (20.7%)  | 13 (3.3%)         | 2.72 | 1.01 |
| Close proximity of CEA to the community                                  | 274 (68.5%)   | 107 (26.8%) | 19 (4.8%)         | 2.63 | 0.13 |
| Good CEA communication skills                                            | 344 (86.0%)   | 44 (11.0%)  | 12 (3.0%)         | 2.83 | 0.54 |
| Good rapport between agents and farmers                                  | 349 (87.3%)   | 39 (9.8%)   | 12 (3.0%)         | 2.84 | 0.17 |
| Mobility of extension agent                                              | 282 (70.5%)   | 93 (23.3%)  | 25 (6.3%)         | 2.64 | 0.55 |
| Availability of farm inputs to farmers (fertilizers and insecticides)    | 117 (29.2%)   | 172 (43.0%) | 111 (27.8%)       | 2.01 | 0.91 |
| Timely delivery of farm inputs to farmers (fertilizers and insecticides) | 105 (26.3%)   | 173 (43.2%) | 122 (30.5%)       | 1.95 | 0.27 |
| Additional livelihood support (capacity building)                        | 187 (46.8%)   | 165 (41.2%) | 48 (12.0%)        | 2.34 | 0.07 |
| Overall mean                                                             |               |             |                   | 2.55 |      |

Source: Field Data, 2022

In table 4, the attribute "good rapport between agents and farmers" emerged as the most preferred among farmers, with a high mean preference score of 2.84. This indicates that farmers highly value the establishment of positive relationships and effective interactions with the extension agents. It highlights the significance of trust, mutual understanding, and cooperation between farmers and the extension service providers. Following closely, the attribute of "good CEA communication skills" received a mean preference score of 2.83, indicating its prominence in the eyes of farmers. Effective communication is vital for delivering information, guidance, and support to farmers, and these results demonstrate that farmers value clear and efficient communication from the extension agents. Seebaluck and Seebaluck-Heeramun (2017) highlighted the importance of effective communication and collaboration between all stakeholders involved in PPPs. They indicated that this is critical for creating a positive perception among farmers. On the other hand, the attribute "timely delivery of farm inputs to farmers" received the lowest mean preference score of 1.95. This suggests that farmers expressed uncertainty or lack of consensus regarding their preference for the timing of input delivery, such as fertilizers and insecticides. It is possible that farmers have varying needs, seasonal considerations, or logistical challenges that influence their opinions on this attribute. The preference index of 2.55 indicates an overall preference for the attributes associated with the CEPPP extension service delivery. Although specific attributes varied in terms of their mean preference scores, the index suggests an overall inclination towards the desired attributes of the extension service delivery among the surveyed farmers. These findings underscore the importance of fostering strong relationships, effective communication, and understanding the varying needs and preferences of farmers in designing and delivering CEPPP extension services.

#### **Satisfaction with the quality of services delivered by CEPPP in extension delivery**

Table 5 provides insights into the satisfaction levels of farmers regarding the quality of services delivered by the PPP in extension delivery.

**Table 5.** Satisfaction with the quality of services delivered by PPP in extension delivery

| Statements                                                              | Satisfied (3) | Neutral (2) | Dissatisfied(1) | Mean | SD   |
|-------------------------------------------------------------------------|---------------|-------------|-----------------|------|------|
| The Extension agents show sincere interest on solving farmers' Problems | 343 (85.8%)   | 47 (11.7%)  | 10 (2.5%)       | 2.83 | 0.13 |
| Extension agent provide services at the time required/ promised         | 300 (75.0%)   | 89 (22.3%)  | 11 (2.8%)       | 2.72 | 0.27 |
| The organisation provides correct/accurate information to their farmers | 318 (79.5%)   | 72 (18.0%)  | 10 (2.5%)       | 2.77 | 0.77 |
| The extension agents provide prompt services to their customers         | 293 (73.3%)   | 91 (22.8%)  | 16 (4.0%)       | 2.69 | 0.98 |
| The CEA have the required knowledge to answer farmers' questions        | 351 (87.7%)   | 44 (11.0%)  | 5 (1.3%)        | 2.86 | 0.82 |
| The organization has working hours convenient to farmers                | 288 (72.0%)   | 102 (25.5%) | 10 (2.5%)       | 2.69 | 0.61 |
| The organization supply inputs to farmers at the right time             | 232 (58.0%)   | 92 (23.0%)  | 76 (19.0%)      | 2.39 | 0.31 |
| CEA regular visit farmers farm and at home                              | 289 (72.3%)   | 100 (25.0%) | 11 (2.8%)       | 2.69 | 0.65 |
| CEA carries out field demonstration with farmers                        | 261 (65.2%)   | 86 (21.5%)  | 53 (13.3%)      | 2.52 | 0.55 |
| Overall mean                                                            |               |             |                 | 2.68 |      |

Source: Field Data, 2022

The attribute that received the highest mean satisfaction score was "the CEA has the required knowledge to answer farmers' questions" (mean=2.86) (Table 5). This indicates a relatively higher level of satisfaction among farmers with the knowledge and expertise of the Climate Extension Agents (CEAs). It suggests that farmers are content with the CEAs' ability to address their inquiries and provide them with the necessary information. Following closely was the statement "the extension agents show sincere interest in solving farmers' problems" (mean=2.83). This indicates a relatively higher level of satisfaction among farmers regarding the sincere interest shown by the extension agents in addressing their problems. It suggests that the majority of farmers are satisfied with the genuine dedication and commitment demonstrated by the extension agents in assisting them with their challenges. On the other hand, the statement "the organization supplies inputs to farmers at the right time" received the lowest mean satisfaction score of 2.39. This indicates that respondents neither expressed satisfaction nor dissatisfaction with the timely supply of inputs. It suggests that farmers' opinions regarding the punctuality of input delivery are relatively neutral and do not strongly lean towards either satisfaction or dissatisfaction. The satisfaction index, calculated as 2.68, represents the overall satisfaction with the quality of services delivered by the PPP in extension delivery. This indicates that, on average, farmers are satisfied with the mentioned services provided by the PPP. This positive perception can lead to increased participation, adoption of new technologies, and improved productivity (Tahir et al., 2016).

#### Factors influencing farmers' perception on the CEPPP

The multivariate probit analysis in Table 6 identifies factors that influence farmers' perception, preferability, and satisfaction with the CEPPP. The Wald chi-square statistic of 214.44 with a probability value (Prob>chi2) of 0.0000 indicates that the model is highly significant.

**Table 6.** Factors influencing farmers' perception on the CEPPP

| Variables              | Perception |           | Preferability |           | Satisfaction |           |
|------------------------|------------|-----------|---------------|-----------|--------------|-----------|
|                        | Coeff      | Std. Err. | Coeff         | Std. Err. | Coeff        | Std. Err. |
| Sex                    | -.00       | .00       | -.00          | .01       | .00**        | .00       |
| Age                    | -.23       | .18       | -.33**        | .16       | -.10         | .15       |
| Marital status         | .03        | .16       | .76           | .16       | -.11         | 0.14      |
| Education              | 2.15***    | .47       | 1.62***       | .41       | -.02*        | 0.01      |
| Access to extension    | .03**      | .01       | -1.02         | .79       | .66***       | 0.15      |
| Cooperative membership | 2.00***    | .27       | .57***        | .19       | .01          | 0.01      |
| Household size         | .00        | .02       | 1.79***       | .68       | .59***       | .23       |
| Access to credit       | .48        | .48       | -.06          | .09       | .94**        | .47       |
| Farm size              | -1.24**    | .53       | -.03          | .019      | -.09         | .17       |
| Ownership of land      | .48***     | .18       | .28           | .716      | -1.61***     | .35       |
| cons                   | -2.17***   | .68       | -2.07**       | .91       | 1.60         | .65       |

Number of obs= 400 Log likelihood= -550.14699

Wald chi2= 214.44 Prob&gt;chi2= 0.0000

Source: Authors Construct, 2022

### Suitability

Education is significant ( $p < 0.01$ ), suggesting that education levels have a substantial and positive impact on farmers' perception of the suitability of the CEPPP. This finding indicates that as the level of education increases among farmers, their perception of the suitability of the CEPPP tends to be positive. Higher education equips individuals with critical thinking skills, analytical abilities, and a broader understanding of various subjects (Ndamani and Watanabe, 2017; Uddin et al., 2017).

Access to extension is significant at 5%, indicating that having access to extension services has a positive effect on farmers' perception of the CEPPP. This finding suggests that when farmers have access to extension services, they are more likely to view the programme in a positive light. Extension services often involve interactions between farmers and extension agents or experts who can provide personalized advice, guidance, and support. These interactions can build trust, foster relationships, and create a sense of partnership between farmers and the program. As a result, farmers who have access to extension services may feel more valued, supported, and connected to the programme, influencing their perception positively (Ehiapkor et al., 2016).

Cooperative membership is significant ( $p < 0.01$ ), suggesting that being a member of a cooperative has a substantial effect on farmers' perception of the suitability of the CEPPP. Cooperative membership fosters a sense of belonging, collaboration, and community among farmers. Cooperative members frequently engage in collective decision-making processes, knowledge sharing, and cooperative activities. These interactions and social connections within the cooperative can create a supportive environment where farmers feel empowered, valued, and part of a larger network. This sense of community and support may positively influence cooperative members' perception of the CEPPP, as they associate it with the cooperative's benefits and collective success.

Farm size is significant at 5%, indicating that farm size has a statistically significant effect on farmers' perception of the programme. The negative coefficient suggests that larger farm sizes are associated with a more negative perception of the program. Larger farms may have more complex decision-making processes and organizational structures. The implication is that if the program's extension services are not tailored to address the unique requirements of larger farms, it can lead to a negative perception among farmers with larger farm sizes (Uddin et al., 2017; Sanogo et al., 2017).

Ownership of land is significant ( $p < 0.01$ ), suggesting that owning land plays a significant role in influencing farmers' perception of the suitability of the CEPPP. Land



ownership can provide farmers with a stronger sense of ownership and responsibility for their agricultural practices. They are more likely to have a vested interest in improving their land and maximizing its potential. Consequently, they may perceive the CEPPP more positively, viewing it as a valuable resource that can provide them with the necessary knowledge, skills, and support to optimize their land's productivity and profitability (Meseret, 2014).

### **Preferability**

Age has a significant negative influence on farmers' preference for the CEPPP. This finding suggests that as farmers' age increases, their preference for the CEPPP tends to decrease. Older farmers may have more experience and knowledge accumulated over their years of farming. This extensive experience might lead them to develop established practices and routines that have worked well for them in the past. Consequently, they may be less inclined to adopt new approaches or technologies introduced by the CEPPP. Their resistance to change and preference for traditional methods can result in a lower level of preferability for the program (Negash, 2013; Ukoha et al., 2017).

Education is significant (1%), indicating that education has a significant positive effect on farmers' preferability of the CEPPP. As the level of education increases, farmers' preferability of the programme also increases. Education equips individuals with knowledge and skills that can enhance their understanding of new farming practices, technologies, and approaches. Farmers with a higher level of education are more likely to be aware of the potential benefits that the CEPPP can offer and are better equipped to understand and adopt the programme's recommendations. They may have a greater appreciation for the value of extension services and are more willing to engage with them (Gosh et al., 2015; Negash (2013).

Cooperative membership is significant (1%), indicating that cooperative membership has a significant positive influence on farmers' preferability of the CEPPP. Thus, farmers who are members of cooperatives tend to have a higher preferability for the programme compared to non-members. Through their cooperative, farmers can receive tailored advice, training programmes, and access to new technologies, all of which can be associated with the CEPPP. This increased access and support can contribute to higher preferability among cooperative members (Babalola and Olayemi, 2013).

Household size is significant (1%), indicating that there is a strong and positive relationship between household size and farmers' preferability of the CEPPP. Thus, as the size of the household increases, farmers' preferability for the programme also increases. Larger households typically have a greater demand for agricultural production to meet the needs of a larger number of family members. As a result, farmers in larger households may be more motivated to seek out and engage with programmes and services like the CEPPP that can support increased agricultural productivity and income generation (Negash, 2013; Gosh et al., 2015).

### **Satisfaction**

The coefficient for sex is significant (5%), indicating that being a male farmer has a significant influence on satisfaction with CEPPP. Specifically, male farmers tend to have a higher satisfaction for the programme compared to female farmers. Differences in decision-making power within farming households can affect satisfaction levels. Male farmers have more decision-making authority and influence over the CEPPP and its outcomes. This may lead to higher satisfaction.

Education is significant (1%), indicating that education has a significant negative influence on farmers' satisfaction of the CEPPP. Farmers with higher levels of education may have higher expectations regarding the programme's content, delivery, and outcomes. If the CEPPP programme does not meet their expectations or fails to provide advanced or specialised knowledge, they may perceive lower satisfaction compared to less educated farmers (Anang, 2016).

Access to extension is significant at the 1% level. This suggests that having access to extension services has a positive and significant influence on farmers' satisfaction with the CEPPP. Extension services often offer skill development opportunities, such as training workshops or demonstrations, to improve farmers' abilities in specific agricultural areas. Access to these services can equip farmers with new skills or techniques, enabling them to address challenges more effectively and achieve better outcomes. Consequently, farmers who benefit from skill development opportunities are more likely to have higher satisfaction levels. Extension agents serve as vital conduits through which farmers' issues are recognized for further research. They play a crucial role in facilitating the adoption of new technologies within the agricultural community (Ainembabazi and Mugisha, 2014; Ajani and Onwubuya, 2013).

Household size is significant (1%), suggesting that household size has a significant positive influence on farmers' satisfaction with CEPPP. As household size increases, farmers' satisfaction increase. Larger households provide opportunities for collaboration and mutual support among family members engaged in agriculture. They can share knowledge, skills, and responsibilities, which can contribute to improved farm management and increased productivity. The sense of teamwork and support within larger households may positively influence farmers' satisfaction levels (Elias et al., 2016).

Access to credit is significant at 5%. This indicates that access to credit has a positive and significant influence on farmers' satisfaction with CEPPP. Access to credit provides farmers with the financial flexibility to invest in their agricultural activities. Farmers who have access to credit can secure funds for purchasing inputs, equipment, or technology, which can enhance their productivity and profitability. This improved financial capacity can lead to higher levels of satisfaction with the CEPPP programme (Elias et al., 2016).

Ownership of land is significant at 1% level. This suggests that owning land has a negative and significant influence on farmers' satisfaction with the programme. Farmers who own land may have higher expectations for the programme in terms of resource allocation and support. They might anticipate more significant investments or preferential treatment due to their land ownership status. If the programme does not meet these expectations or fails to allocate resources equitably, farmers who own land may express lower satisfaction levels.

## Conclusion

The paper discusses the Cocoa Extension Public-Private Partnership (CEPPP) model, which is a unique model designed to improve the delivery of cocoa extension delivery services. The study revealed that the majority of respondents were well-informed about the various services offered by the CEPPP. These services included cocoa rehabilitation, farmer training, cocoa seedling supply, mass pruning, and CODAPEC/Hi-Tech. However, only a few respondents were aware of the CEPPP's role in facilitating farmer cooperatives formation and pollination. Farmers expressed a positive perception of the extension delivery provided by the CEPPP, considering it suitable for their needs.

Additionally, respondents showed preference for all the investigated attributes of the CEPPP. The overall satisfaction mean score of 2.68 indicated that farmers were highly satisfied with the quality of extension services provided by the CEPPP. Various factors influenced farmers' perception, preference, and satisfaction with the CEPPP. These factors included age, education level, cooperative membership, household size, gender, access to extension services, access to credit, land ownership, and farm size.

Based on the study's findings, it is recommended to improve awareness among cocoa farmers regarding the complete range of services provided by the CEPPP. Targeted initiatives such as information campaigns, workshops, and farmer training programmes should be implemented to effectively communicate and educate farmers about these services. The positive perception for suitability and preference for the CEPPP's extension delivery indicate that it is meeting the needs of farmers. The CEPPP should strive to ensure that extension services are easily accessible to all farmers, regardless of factors such as age, education, and gender. This could involve expanding the reach of extension programmes, utilising mobile technology platforms, and conducting outreach activities in remote areas.

By leveraging the expertise, resources, and collaborative efforts of both the public and private sectors, a Cocoa Extension Public-Private Partnership in Ghana can create a transformative impact on rural development, improving the lives of cocoa farmers, promoting sustainable practices, and driving economic growth in rural areas. Overall, the policy implications revolve around creating an enabling environment, providing financial support, promoting sustainable practices, and empowering farmers to ensure the successful implementation and long-term impact of the Cocoa Extension Public-Private Partnership in Ghana.

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