

Factors Influencing Cocoa Farmers' Participation in the Government Spraying Programme in Ghana

Abstract: The study assessed the factors influencing farmers' participation in the government cocoa spraying programme in Ghana using cross-sectional data obtained through interviews and questionnaire administration. We employed a probit model to analyse the determinants of participation. The study revealed that participation in the spraying programme was higher for the following: male farmers, producers with more years in cocoa farming, farmers who had more contact with extension agents, and respondents with smaller household size. Furthermore, the interaction of gender and farming experience showed that being an experienced male farmer decreased the probability of participation. The study recommends the expansion of the government cocoa spraying programme to cover farmers who were unable to participate. In particular, addressing the factors inhibiting the participation of female farmers as well as improving extension service delivery to producers will enhance the effectiveness of the programme.

Keywords: Cocoa production, Ghana, Probit model, spraying programme

1. Introduction

Ghana has become synonymous with cocoa due to the contribution of the country to the production of the crop at the global stage. Currently, the country ranks second to Côte d'Ivoire as the leading producer of the crop. Cocoa production contributes immensely to the nation's gross domestic product and provides livelihood for more than 700,000 farmers. For instance, out of the share of Agriculture GDP, cocoa contributed about 7.4% and 8.2% in 2009 and 2010 respectively with potential growth rate averaging 5% annually (MoFA, 2010). Ghana is a major player in the global cocoa. The crop has contributed to development and poverty alleviation strategies since independence in 1957. However, production levels dwindled in Ghana in the 1960-70s after several decades of being a global leader in cocoa production for several decades. This resulted in a near breakdown of the cocoa sector in the 1980s. However, following reforms in the mid-1980s the cocoa sector began to revive in the 1990s. The country's cocoa output almost doubled between 2001 and 2003. Abankwah et al. (2010) observed that the consistent gain in production falls short of the output of the sector in the 1960s. The decline in production was due to low yields arising from pests and diseases infestation and non-adoption of research recommendations.

To curb the fall in production and increase the efficiency of the cocoa sector, the Government of Ghana in the early 1990s embarked on several cocoa sector policy reforms. The most dominant policy shift was the introduction of partial liberalisation in the cocoa sector that paved the way for private buying companies who were licensed to buy cocoa alongside the state-owned Produce Buying Company (PBC). The government instituted a development strategy in 1999 to revamp the cocoa industry. Closely following the 1999 strategy was the approval of the Cocoa Sector Development Strategy. The aim was to revamp the sector to bring about rural development and poverty alleviation. The government set the target of increasing cocoa output from 335,000 tons to 500,000 tons by the year 2004/5. The target for 2009/10 was 700,000 tons. The goal was to maintain this production level thereafter. Associated with this strategy is the cocoa diseases and pests control programme under which the government freely mass-sprayed all cocoa farms. According to the Cocoa Research Institute's recommendation, cocoa farms require four spraying regimes per annum between

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July and November (Anang et al., 2013). Apart from the free government spraying, cocoa farmers are required to supplement the government spraying with their personal spraying to ensure total crop protection. As part of cocoa sector strategy was the Cocoa 'Hi-Tech' Programme designed to improve productivity through the provision of production inputs and subsidized credit. There was subsequent expansion of the programme to cover 100,000 beneficiaries. The programme began with about 50,000 participants, doubling in participation. Currently, an investment exceeding US\$200 million has gone into the cocoa spraying exercise in order to increase the production of cocoa for export through government's intervention. As part of the package, 1.6 million bags of inorganic fertilisers and 22,000 litres of organic fertilizers were budgeted for distribution to farmers to help raise yield levels of the crop.

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Even though the expectation is that the government cocoa spraying programme will benefit every cocoa farmer, there is evidence to show that some farmers are not able to participate. For example, Anang et al. (2011) reported that 30 percent of cocoa producers in the Bibiani-Anhwiaso-Bekwai District of Ghana could not participate in the spraying programme. A major reason assigned for non-participation was the inadequate number of spraying personnel. The non-participation of cocoa farmers in the spraying programme is of concern to researchers, the Cocoa Research Institute and the Ministry of Food and Agriculture involved in initiating and promoting the programme to enhance cocoa production in the country. While attention often focuses on developing new technologies, there is no concomitant attention to assess the barriers to participation and/or adoption. Information on the socio-economic determinants of participation in the cocoa spraying programme in Ghana is very limited despite the importance of cocoa to the Ghanaian economy and the significance of the spraying programme to the cocoa sector. It is in this light that we sought to bridge the knowledge gap by providing empirical evidence of the factors restriction participation by farmers in the government-sponsored spraying programme.

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The literature is replete with studies on the factors that determine participation in agricultural programmes (see for example, Mann 2005; Wiredu et al. 2011; Udo 2014). Much of these studies have considered a broad range of factors such as gender, education, farm size, extension contact, household size, farm experience, age, distance and credit. However, the findings do not always agree. For instance, Damianos and Giannakopoulos (2002) found participation in an environmental programme in Greece to be higher for farmers with larger farm size. Vanslebrouck et al. (2002) however found participation to be higher for farmers having smaller farm sizes in a study in Belgium. According to Mann (2005), participation is higher for smaller farm owners while other researchers like Wynn et al. (2001) and Dupraz et al. (2002) do not find any association between participation and farm size.

Socio-economic factors such as gender, age, farming experience, occupation and group membership also affect participation in agricultural programmes. Udo (2014) underlined how these factors influence programme participation in Nigeria. The author indicated that gender, age, farming experience, occupational status and membership of cooperative societies influenced farmers' participation.

In another study, Wiredu et al. (2011) examined the relationship between adoption of hybrid cocoa varieties and land productivity in Ghana and found several socio-economic factors affecting participation. Among the factors were age, household size, access to credit and extension, group membership, and application of fertilizer. Other factors such as sex and education did not significantly affect adoption.

Etwire et al. (2013) also examined factors affecting participation in agricultural projects in Ghana. The results of a probit analysis showed the factors influencing participation in agricultural projects to include educational level, access to credit and extension service.

Even though Botlhoko and Oladel (2013) also focused on socio-economic factors, their study placed much emphasis on programme effectiveness and constraints as the main determinants of farmers' participation in agricultural programmes and thus shifting the study to a different dimension. For them, the probability of farmers' participation in agricultural programme increases with household size and programme effectiveness but decreases with constraints.

Martey et al. (2014) replicated the use of the probit model to examine farmers' willingness to take part in a multi-stakeholder platform in Northern Ghana. The study showed the determinants of participation to include age, income and household size.

In a study to examine the adoption of some cocoa production technologies by farmers in Ghana using multinomial logistic regression analysis, Aneani (2012) found adoption to be influenced by factors such as gender, farm size, yield, age of the farm, and access to credit.

In conclusion, the literature confirms that farmers' characteristics interplay in the participation in agricultural interventions. However, there remain gaps in knowledge regarding the direction of impact of the factors affecting participation in agricultural programmes especially in Ghana. Modelling participants' motivations underlying participation or uptake of programme interventions remains a challenge to research as indicated in some studies (Willock et al., 1999; Morris, 2004; DeFrancesco, 2006). Using the Bibiani-Anhwiaso-Bekwai District in Ghana as a case study, this study contributes to our understanding of the factors affecting smallholder farmers' participation in programmes intended to enhance their productivity. It is our anticipation that the results of the study will contribute to addressing the problem of non-participation in the cocoa spraying programme and thereby improve the productivity of farmers.

The structured of the paper is as follows: section 1 covers the introduction. The methodology used, including the survey process and analytical framework is presented in section 2. We present the results and discussion of the major findings in section 3. Finally, the conclusions as well as the recommendations from the study are in section 4.

2. Methodology

2.1 Study area and data

The current study was conducted at Bibiani-Anhwiaso-Bekwai District, which is located in the Western Region of Ghana. The Western Region is the leading cocoa producing Region in the country and Bibiani-Anhwiaso-Bekwai is a leading cocoa producing district in the Region. The District has a forest vegetation type and the annual rainfall varies from 1200 mm to 1500 mm. The rainfall pattern is bimodal in the forest areas and is very conducive for cocoa production. The bimodal rainfall pattern contrasts with the unimodal rainfall pattern in the savannah zones of the country where the long spell of dry season does not support cocoa cultivation.

A field survey was used to identify 80 cocoa farmers who were selected at random from four communities using semi-structured questionnaire. Demographic, socioeconomic and

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production data were collected. From the total sample of 80 respondents, 78 provided complete information and were included in the final analysis.

2.2 Empirical model

Due to the binary nature of the dependent variable, that is participation in the cocoa spraying programme, we employed the probit model to analyse the data. The probit model is suitable for small datasets and has been widely applied to the estimation of participation models in the current literature (for example, Botlhoko and Oladel 2013; Etwire et al. 2013; Martey et al. 2014; Udo 2014).

More clearly, farmers either participate in the programme or otherwise. Therefore, if we denote participation in the spraying programme by y_i , then $y_i = 1$ if farmer participated and $y_i = 0$ if farmer did not participate. The predicted probabilities are then constrained to lie between 0 and 1. With the probit model only the values of 0 and 1 can be observed for the y_i , but there is a latent variable y_i^* that determines y_i (Sebopetji and Belete, 2009).

Following Greene (2008), the probit model can be written as:

$$y_i = 1 \text{ if } y_i^* > 0 \text{ and } y_i = 0 \text{ if } y_i^* \leq 0 \quad (1)$$

where Φ is the cumulative distribution function of the standard normal distribution, x_i represents a vector of random explanatory variables and β is a vector of parameters to be estimated.

We specify the empirical model of the probit regression as follows:

$$y_i^* = \beta_0 + \sum_{j=1}^8 \beta_j x_{ij} + v_i \quad (2)$$

where y_i^* is the latent variable representing farmers' participation in the spraying programme, x_1 to x_8 are the independent variables influencing participation namely gender, education, farm size, household size, farm income, farming experience, extension contact, and the interaction of gender and farming experience, respectively. v_i is a random disturbance term.

The latent variable (y_i^*) is related to the observable binary variable (y_i) through the expression:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (3)$$

Due to the non-linearity of the probit model, the parameters do not represent the marginal effects of the explanatory variables. The marginal effects are more informative and easy to understand and explain. The results of the marginal effects provide useful guidelines for decision-making by policymakers. The marginal effect is the differential of equation (1) with respect to x_i (Greene 2008):

$$\frac{\partial y_i}{\partial x_i} = \frac{\partial \Phi(\beta_0 + \sum_{j=1}^8 \beta_j x_{ij})}{\partial x_i} = \Phi(\beta_0 + \sum_{j=1}^8 \beta_j x_{ij}) [1 - \Phi(\beta_0 + \sum_{j=1}^8 \beta_j x_{ij})] \beta_i \quad (4)$$

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where ϕ denotes
the probability
density function
of the standard
normal
distribution.

Our choice of variables for this study is based on intuition and literature (Botlhoko and Oladel, 2013; Dupraz et al., 2003; Etwire et al., 2013; Martey et al., 2014; Wossink and Wenum, 2003) as these have been shown to play key roles in farmers' programme participation.

We present the definition of the explanatory variables used in the study and our *a priori* expectations of their relationship with the dependent variable in Table 1. A positive sign means that the variable in question is expected to increase the probability of participation in the spraying programme and vice versa.

Table 1: Definition and expected signs of the variables in the probit model

Variable	Definition/measurement	Sign
Participation in programme	Dummy: 1 if farmer participated; 0 for otherwise	
Gender	Sex of farmer: 1 if male; 0 for otherwise	+
Education	Dummy: 1 if educated; 0 for otherwise	+/-
Farm size	Farm size in acres	+
Farm income	Farm income in Ghana Cedis	+
Extension contact	Number of extension visits per annum	+
Household size	Total number of household members	+/-
Farming experience	Years of farming experience	+

We expect the gender of the farmer to have a positive relationship with participation implying that we expect male farmers to have higher participation in the programme compared to their female counterparts. This is due to the inherent bias against women farmers in most developing countries in terms of access to resources and participation in interventions.

Education increases farmers' awareness of the benefits of interventions and the ability to acquire information. Hence, we expect the variable to have a positive impact on participation. However, participation is likely to decrease if educated farmers choose to engage in off-farm activities due to their higher opportunity cost of labour, which may reduce participation. We therefore hypothesise an indeterminate sign for the education variable.

With respect to farm size, we hypothesised a positive relationship with participation in the cocoa mass spraying programme. This is because farmers with larger farm holdings are likely to be influential members of the society and thus more likely to be beneficiaries of government interventions. Similarly, we expect farm income to have a positive effect on participation because households with higher incomes are likely to be influential members in the society.

Extension agents are the conduit between farmers and the service provider (COCOBOD) so we expect extension contact to have a positive impact on participation. Communities without extension agents are less likely to be involved in the programme just as farmers who are unable to access extension service. We expect household size to exert either positive or negative influence on participation. This is because we anticipate that larger households may have social influence that is likely to aid their accessibility to the spraying personnel. However, labour-constrained small households may be desperate to get their farms sprayed and may therefore be more eager to search for spraying personnel. Finally, we expect farmers who have several years of farming experience to be knowledgeable about farming as well as

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have better acquaintance with extension agents and the spraying personnel, which are likely to facilitate participation in the spraying programme.

3. Results and Discussion

We present the results of the study together with the discussion of the relevant findings in the following section. Table 2 presents the descriptive statistics of the respondents according to their participation status: the means and standard deviations as well as the *t*-test of mean differences of the variables use in the model.

Table 2: Descriptive statistics of respondents according to participation status

Variable	Mean	Std. Dev.	Participants (N = 54)	Non-Participants (N = 24)	<i>t</i> -test
Gender	0.82	0.39	0.83	0.79	-0.44
Education	0.88	0.32	0.89	0.86	-0.18
Farm size	7.76	5.76	7.70	7.73	-0.03
Farm income	1937	2029	1874	2078	0.41
Extension contact	0.36	0.81	0.50	0.04	-2.39**
Household size	9.99	2.94	9.48	11.1	2.34**
Farming experience	15.3	7.72	15.6	14.6	-0.51

** Significant at 5% level

From the results, gender, educational status, farm size and farming experience did not exhibit any significant difference between participants and non-participating groups. Overall, about 69 percent of respondents participated in the programme, with 82 percent being males. With respect to gender, even though the results of the *t*-test did not show any significant difference between programme participants and non-participants, it highlights the perceived marginalisation of women farmers in developing countries with regard to access to production resources and participation in development programmes due to their low social and political power (FAO, 1994; IFAD, 2001).

About 88% of the respondents had been to school and obtained some level of formal education. We recorded education as a dummy variable and therefore are unable to give sufficient information about the levels of educational attainment. The average years of farming experience among the respondents was 15 with average farm size equal to 8 acres and household size averaging 10 members. Furthermore, the average income from cocoa production was GH¢1937 while 36% of the respondents made contact with an extension agent during the farming season. Even though farm income was a little higher for non-participants, the mean difference was not significant.

Contact with extension agents was higher for programme participants, and the mean difference was statistically significant, implying that the variable is likely to play an influential role in farmers' participation in the spraying programme. The number of household members was higher for non-participants and the mean difference was statistically significant. Hence, household size is also likely to influence participation in the spraying programme.

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3.1 Factors determining participation in the spraying programme

We present the factors influencing participation of cocoa farmers in the government-sponsored spraying programme (estimated by the probit model) in Table 3.

Table 3: Maximum likelihood estimates of the probit participation model

Variable	Coefficient	Standard Errors	P > z	Marginal effects
Gender of farmer	2.203	1.230	0.073*	0.635
Educational level	-0.423	0.654	0.518	-0.122
Household size	-0.168	0.071	0.017**	-0.048
Farm size	-0.013	0.032	0.696	-0.004
Farm income	-0.142	0.239	0.553	-0.041
Extension contact	1.047	0.471	0.026**	0.302
Farming experience	0.114	0.061	0.060*	0.033
Gender × Experience	-0.118	0.070	0.093*	-0.034
Constant	1.454	1.802	0.420	-

* Significant at 10 percent level; ** Significant at 5 percent level; Log-likelihood = -39.7; Wald chi2 (8) = 17.0; Prob> chi2 = 0.03; Pseudo R2 = 0.18; Percentage correctly classified = 74.4.

The Wald chi-square value of 16.98 for the model is statistically significant at 5% indicating that the independent variables jointly explain the probability of participating in the spraying programme. Four out of the seven explanatory variables were significant determinants of participation with three of the variables confirming our *a priori* expectations. Specifically our results showed that gender, extension contact, household size and years of farming experience significantly influence farmers' participation in the programme.

Our aim is to help stakeholders understand the degree to which the estimated coefficients from the probit model affect participation in the cocoa spraying programme. Hence, besides the estimation of the probability of participation, we also estimate the marginal effects of the coefficients and discuss the significant variables.

The coefficient for gender is positive and statistically significant at 10% with a marginal effect of 63.5%. From the result, men had a higher probability of participation compared to women. This observation is consistent with DeFrancesco et al. (2006) and Chiputwa et al. (2011). The reason for this finding is that in a typical rural setting, household heads are usually males who are the decision-makers in terms of access to resources and participation in programmes. Women often need the permission of their husbands to participate in programmes thus constraining their participation rates.

Contact with extension agents had a positively significant effect on participation. This means that as the number of extension contacts increases, farmers are more likely to participate in the programme. An additional contact with extension agent increases participation in the spraying programme by 30.2%. The result is in line with our *a priori* expectation. The implementation of agricultural projects and programmes of the Government of Ghana is usually through the Agricultural Extension Services Directorate of the Ministry of Food and Agriculture (MoFA). MoFA also collaborates with other institutions as well as farmer groups to extend services to farmers. Extension agents therefore facilitate access to agricultural interventions and services such as the cocoa spraying programme.

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Household size was significant at 5% but with -4.8% marginal effect. Farmers with larger households are therefore 4.8% less likely to participate in the spraying programme for every additional member added to the farm household. This is because larger households may be less labour-constrained which may lead to less urgency in following up the spraying personnel. Larger households may also be preoccupied with meeting the family basic needs such as food, clothing and shelter, such that they may have little or no time left to follow up spraying personnel.

Farming experience was a significant factor influencing participation in the spraying programme and had a marginal effect of 3.3%. This implies that farmers who are more experienced in cocoa farming tend to be 3.3% more likely to participate in the programme compared to their less experienced counterparts. Our result in this regard is plausible and expected. More experienced household heads have over time, developed some understanding of programmes that can help raise farm yields and this may tend to improve their decisions to participate in programmes (Makhura et al., 2001).

The interaction between gender and farming experience was negative and significant at the 10 percent level even though the influence of the individual variables on participation was positive. The interaction between the two variables showed that female farmers with experience in cocoa farming are 3.4% more likely to participate in the mass spraying programme compared to their male counterparts. The introduction of the interaction term is thus useful as it provides additional information on how the variables in the model influence programme participation.

4. Conclusion and Recommendations

The study adopted the binary probit model to estimate the determinants of farmers' participation in the government cocoa spraying programme in Ghana. Our results revealed that farmer characteristics including gender of the farmer, contact with extension, household size and farming experience significantly affect participation in the government cocoa spraying programme. We therefore propose the following recommendations to enhance participation in the programme.

First, there is the need to eliminate the gender inequality in access to and participation in the government-sponsored spraying programme. Women's participation in programmes have been shown by this and other research findings to be lower than men and effort to enhance women's participation will go a long way to increase cocoa output in Ghana.

Furthermore, scaling up extension service delivery to farmers will enhance participation in the spraying programme as shown by the significant impact of extension contact on programme participation. In particular, the use of mass extension methods needs emphasis as a panacea to the limited number of extension agents in the country. For example, mass communication through radio, television and communication vans are potential means to reach farmers in remote areas. In addition, there is the need to strengthen farmer-based groups to serve as channels for the dissemination of extension services to farmers which may facilitate the participation of members in the spraying programme.

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References

- Anang, B. T., K. Adusei and E. Mintah. 2011. Farmers' Assessment of Benefits and Constraints of Ghana's Cocoa Sector Reform. *Curr. Res. J. Soc. Sci.* 3(4): 358-363, 2011.
- Anang, B. T., Mensah F. and A. Asamoah. 2013. Farmers' Assessment of the Government Spraying Program in Ghana. *J. Econ. Sustain. Dev.* 4(7):92-99.
- Aneani, F., V. M. Anchirinah, F. Owusu-Ansah and M. Asamoah. 2012. Adoption of Some Cocoa Production Technologies by Cocoa Farmers in Ghana. *Sustain. Agr. Res.* 1(1):103-117.
- Abankwah, V., R. Aidoo and R. K. Osei. 2010. Socio-Economic Impact of Government Spraying Programme on Cocoa Farmers in Ghana. *J. Sustain. Dev. Afr.* 12(4):116-126.
- Bothhoko, G. J. and O. I. Oladele. 2013. Factors Affecting Farmers' Participation in Agricultural Projects in Ngaka Modiri Molema District, North West Province. South Africa. *J. Hum. Ecol.* 41(3):201-206.
- Chiputwa, B., A. S. Langyintuo and P. Wall. 2011. Adoption of conservation agriculture technologies by smallholder farmers in the Shamva District of Zimbabwe: A Tobit application. Paper accepted for the 2011 meeting of the Southern Agricultural Economics Association (SAEA) in Texas, USA, February 5 – 8, 2011.
- Damianos, D. and N. Giannakopoulos. 2002. Farmers' participation in agri-environmental schemes in Greece. *Brit. Food. J.* 104 (3/4/5):261-273.
- Defrancesco, E., G. Paola, R. Ford and T. Samuel. 2006. Factors Affecting Farmers' Participation in Agri-Environmental Measures: Evidence from a Case Study. Centre for International Food and Agricultural Policy, pp.1-25.
- Dupraz, P., D. Vermersch, B. H. De Frahan and L. Delvaux. 2003. The environmental supply of farm households. *Environ. Res. Econ.* (25):171-189.
- Dupraz, P., I. Vanslebrouck, F. Bonnieux and G. Huylensbroeck. 2002. Farmers' participation in European agri-environmental policies, X EAAE Congress on Exploring Diversity in the European Agri-Food System, Zaragoza, Spain, 28-31 August 2002.
- FAO, 1994. Women, Agriculture and Rural Development: A Synthesis Report of the Africa Region, Rome.
- Greene, W. H. 2008. *Econometric Analysis*, 6th Edition, Upper Saddle River, New Jersey, Prentice-Hall, New York University.
- IFAD. 2001. Rural Poverty Report 2001: The Challenge of Ending Rural Poverty. Oxford University Press. February, 2001.
- Makhura, M-N., J. Kirsten and C. Delgado. 2001. Transaction Costs and Smallholder Participation in the Maize Market in the Northern Province of South Africa. In: Seventh

- 407 Eastern and Southern Africa Regional Maize Conference, Pretoria, South Africa. 11–15
408 February, pp. 463–46.
- 409
- 410 Mann, S. 2005. Farm size growth and participation in agri-environmental schemes: a
411 configural frequency analysis of the Swiss case. *J. Agr. Econ.* 56 (3):373-384.
- 412
- 413 Martey, E., P. M. Etwire, A. N. Wiredu and W. Dogbe. 2014. Factors influencing willingness
414 to participate in multi-stakeholder platform by smallholder farmers in Northern Ghana:
415 implication for research and development. *Agr. Food Econ.* 2(11):2-15.
- 416
- 417 Ministry of Food and Agriculture (MoFA). 2010. Agriculture in Ghana: Facts and Figures,
418 Accra, Ghana.
- 419
- 420 Morris, C 2004. Networks of agri-environmental policy implementation: a case study of
421 England's countryside stewardship scheme, *Land Use Policy*, (21):177-191.
- 422
- 423 Etwire, P. M., D. Wilson, N. W. Alexander, E. Martey, E. Eunice, K. O. Robert and W.
424 Esther. 2013. Factors Influencing Farmer's Participation in Agricultural Projects: The case of
425 the Agricultural Value Chain Mentorship Project in the Northern Region of Ghana. *J. Econ.*
426 *Sustain. Dev.* 4(10):36-43.
- 427
- 428 Sebopetji, T. O. and A. Belete. 2009. An Application of Probit Analysis to Factors Affecting
429 Small-Scale Farmers' Decision to take Credit: a Case Study of Greater Letabo Local
430 Municipality in South Africa. *Afr. J. Agr. Res.* 4(8):718-723.
- 431
- 432 Udo, N. C. 2014. Socio-Economic Factors Influencing Farmers' Participation in Community-
433 Based Programme in Abia and Cross River States of Nigeria. *J. Agr. Ext.* 18(1):48-61.
- 434
- 435 Vanslebrouck, I., G. van Huylenbroeck and W. Verbeke. 2002. Determinants of the
436 willingness of Belgian farmers to participate in agri-environmental measures. *J. Agr. Econ.*
437 53 (3):489-511.
- 438
- 439 Willock, J., I. J. Deary, M. J. McGregor, A. Sutherland, G. Edwards-Jones, O. Morgan, J. B.
440 Dent, R. Grieve and G. J. Gibson. 1999. The role of attitudes and objectives in farmer
441 decision making: business and environmentally-oriented behaviour in Scotland. *J. Agr. Econ.*
442 50 (2):286-303.
- 443
- 444 Wiredu, A. N., A. Mensah-Bonsu, E. K. Andah and K. Y. Fosu. 2011. Hybrid Cocoa and
445 Land Productivity of Cocoa Farmers in Ashanti Region of Ghana. *World J. Agr. Sci.* 7
446 (2):172-178.
- 447
- 448 Wossink, G. A. A. and J. H. van Wenum. 2003. Biodiversity conservation by farmers:
449 analysis of actual and contingent participation. *Eur. Rev. Agr. Econ.* 30 (4):461 – 485.
- 450
- 451 Wynn, G., B. Crabtree and J. Potts. 2001. Modelling farmer entry into the environmentally
452 sensitive area schemes in Scotland. *J. Agr. Econ.* 52 (1):65-82.