

Research Application Summary

Factors influencing maize farmers' access and utilisation of Agricultural Information in Tolon and Kumbungu Districts in Northern Ghana

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Abstract

Maize farmers' access and utilization of information on improved farming technologies is essential in increasing yield of maize. However, maize farmers continue to record low yield, partly due to poor access and utilisation of information. The study investigated the factors that influence farmers' access to and use of agricultural information on the maize yield in Tolon and Kumbungu Districts in Northern Ghana. A total of 390 respondents were randomly selected from five (5) communities for the study. Questionnaires and personal interviews were used in collecting data. Secondary data were also obtained from institutions such as Savannah Agriculture Research Institute (SARI) and International Institute for Tropical Agriculture (IITA) to compliment the primary data. Descriptive statistics, namely, percentages and frequencies, and probit regression were used to analyse the data. The results revealed that land ownership, timely information, importance of information, understanding of information, utilization of information, access to labour, access to credit and access to extension have significant influence on access to and utilization of agricultural information. The research recommends that there is need for Ghana Ministry of Food and Agriculture (MoFA) to collaborate with research institutions to identify and train maize value chain actors on timely information access and management. It is also necessary for MoFA to partner with private financial institutions to make credit available, since, farmers' access to credit play a key role in agricultural information access as well as its utilisation.

Key words: Credit, extension delivery, farming technologies, Ghana, information access, maize value chain actors

Résumé

L'accès et l'utilisation par les producteurs de maïs des informations sur les technologies agricoles améliorées sont essentiels pour augmenter le rendement du maïs. Cependant, les producteurs de maïs continuent d'enregistrer de faibles rendements, en partie à cause du manque d'accès et d'utilisation de l'information. L'étude a examiné les facteurs qui influencent l'accès des agriculteurs à l'information agricole et son utilisation sur le rendement du maïs dans les districts de Tolon et de Kumbungu au nord du Ghana. Au total, 390 personnes ont été sélectionnées au hasard dans cinq (5) communautés pour l'étude. Des questionnaires et des entretiens personnels ont été utilisés pour la collecte des données. Des données secondaires ont également été obtenues auprès d'institutions telles que le Savannah Agriculture Research Institute (SARI) et l'International Institute for Tropical Agriculture (IITA) pour compléter les données primaires. Des statistiques descriptives, à savoir les pourcentages et les fréquences, et la régression probit ont été utilisées pour analyser les données. Les résultats ont révélé que la propriété foncière, l'information opportune, l'importance de l'information, la compréhension de l'information, l'utilisation de l'information, l'accès au travail, l'accès au crédit

et l'accès à la vulgarisation ont une influence significative sur l'accès à l'information agricole et son utilisation. La recherche recommande que le Ministère de l'Alimentation et de l'Agriculture du Ghana (MoFA) collabore avec les institutions de recherche pour identifier et former les acteurs de la chaîne de valeur du maïs sur l'accès et la gestion de l'information en temps opportun. Il est également nécessaire que le Ministère de l'Alimentation et de l'Agriculture s'associe à des institutions financières privées pour rendre le crédit disponible, car l'accès des agriculteurs au crédit joue un rôle clé dans l'accès à l'information agricole ainsi que dans son utilisation.

Mots clés : Crédit, vulgarisation, technologies agricoles, Ghana, accès à l'information, acteurs de la chaîne de valeur du maïs.

Introduction

Agricultural sector is essential to the livelihoods smallholder farmers in the sub-Saharan Africa as it plays a major role in employment and income generation (Dovie and Kasei, 2018). Ghana's agricultural sector is dominated by smallholder farmers who hold small portion of lands scattered across rural areas of the country (Amadou *et al.*, 2018). Majority of these smallholder farmers are engaged in cereal production of which maize cultivation dominates (Deutsch *et al.*, 2018). In Ghana, maize is a major staple crop used as a substitute for other major cereals that are often in short supply during the lean season (MoFA, 2016). This has resulted to an increase in demand for maize for both domestic and industrial purposes (Codjoe, 2007).

The high demand for maize in Ghana for both domestic and industrial purposes has led to a radical approach to increase production of maize through the development of improved maize farming technologies among farmers (Armar-Klemesu *et al.*, 2018). After the development of these improved maize farming technologies by research institutions such as SARI, IITA and UDS, the innovations are expected to be disseminated to farmers in a coherent manner geared towards increasing adoption and production of maize by farmers. Effective utilization of improved maize farming technologies adds to raising productivity leading to improvement in household income and livelihood enhancement of farmers (Simtowe, 2011). Also, utilization of information on improved farming technologies influences agricultural output and ultimately impacts on the livelihood status of farmers (Meinzen-Dick *et al.*, 2002).

Farmers' access and utilization of information on improved farming technologies is therefore essential in increasing yield of maize. Effective access to and use of information and knowledge are critical factors for rapid economic growth and wealth creation among farmers' and for improving socio-economic well-being of farmers (Benin *et al.*, 2007). There is no doubt that farmer's access to and use of information on improved farming technologies are increasingly becoming the key drivers for socio-economic development world-wide. As noted by Dercon *et al.* (2007) farmers access to and use of information on innovation will decrease farmers' likelihood of being poor by as much as 10%. Infact, Owens *et al.* (2003) observed that farmers access to and use of information on agricultural production increases the value of output by 15%. Generally, farmers access to and use of information increases their income levels, assets, food and food security (Benin *et al.*, 2007). Increase in farmers' access to and use of information directly influence farmers' livelihood, which translates into more income for the household, increase in household assets and improvement in the social capital of the farmers (Ojo *et al.*, 2013). In order to achieve agricultural development and enhancement of farmers' livelihoods, an effective information delivery system is needed to disseminate information to farmers (Swanson and Rajalahti, 2010). However, dissemination of information on new technologies and better farming practices to farmers can best be achieved through effective agricultural extension system (Owens *et al.*, 2003). In Ghana, the extension division under the Ministry of Food and

Agriculture (MoFA) is the sole unit responsible for information dissemination since independence (MoFA, 2000). However, in recent times private extension service delivery have taken up the mandate of information dissemination to farmers due to the inadequate number of extension officers in the system and Government inability to recruit more extension officers (MoFA, 2015). The incorporation of private extension service delivery is to offer more cost-effective agricultural extension services to farmers. It is prudent to note that farmers require the services of extension officers on delivering best agricultural practices at the right time of the farming season (Dormon, 2004). Agricultural extension and other advisory services are expected to support farmers on agricultural production and facilitate their efforts to solving production problems, link farmers to markets and other players in the agricultural value chain and obtain information, skills, and technologies to improve their livelihoods (Birner *et al.*, 2009). In order to achieve effective information dissemination and extension services delivery, it is imperative to understand farmers' access to and use of this agricultural information to improve farming practices.

Research Problem

According to Adebayo (2004), agricultural extension services delivery are very important entities in the development of the agricultural sector in developing countries because of the role they play through provision of information and other support services to farmers. Agricultural extension services delivery continues to be a key facilitator to achieving food security and to reducing poverty of most of the rural population in the developing countries. Research evidence show that rural livelihoods are greatly enhanced by access to information on improved agricultural practices, market and weather (Saravanan, 2010). Agricultural information brings credible opportunities and has the potential of enabling the empowerment of farming communities with current happening in the agricultural sector leading to enhancing livelihood of farmers in general (Saravanan, 2010). Also, research has shown that access to information by farmers at the right time is very essential to increasing agricultural productivity (Mgbada, 2006). Therefore, farmers need constant and updated information on agronomic practices, disease and pest control, postharvest practices, credit facilities and diversification of livelihoods to better their lives (Mariano *et al.*, 2012). When farmers have access to information and effectively utilize it, there will be an improvement in agricultural productivity and this would ultimately lead to improvement in livelihood outcomes.

In recognition of the benefits that agricultural information delivery offers to farmers, the Government of Ghana and some Non-Governmental Organizations (NGOs) have been disseminating information aimed at promoting maize cultivation and marketing. Some of this information dissemination includes information on improved seeds, access to credit facilities, financial support and subsidies to maize value chain development and market facilitations (Avea *et al.*, 2016). Despite these efforts made by the Government and private extension services towards increasing production outcomes and enhancing livelihood of farmers, there have been observed differences in production outcomes resulting in differences in livelihood outcomes because of the level of access to and use of information among farmers (Tilman *et al.*, 2002; Ojo *et al.*, 2013; Aker *et al.*, 2016). However, there is a dearth in knowledge regarding factors influencing farmers' access and utilization of agricultural information. The study determined the factors influencing maize farmers' access to and utilisation of agricultural information on maize yield among smallholder farmers in Tolon and Kumbungu Districts in Northern Region of Ghana.

Methodology

The study adopted the Random Utility Theory (RUT) based on farmers' decision to access and use agricultural information. The underlying economic theory of factors that influence the decision to access and use agricultural information is based on the assumption that farmers are motivated by

utility maximization (Adesina and Zinnah, 1993). Farmers form expectations of the cost and benefit through analysis of information they access. In line with Nkamleu and Adesina (2000) and Marenya and Barrett (2007), it was assumed that farmers behave consistently with utility maximization and that farmer’s access and use agricultural information when the expected utility from accessing exceeds that of not-accessing agricultural information. The utility a smallholder maize farmer can derive from a product can be represented as having two components; a utility function of observed characteristics known as the deterministic component of utility and the unobserved component known as the random component.

The deterministic component is exogenous and includes farmers’ characteristics and product characteristics and a set of linearly related parameters and the random component may result from missing data/variables (omitted variable), measurement errors and misspecification of the utility function. This function is specified below:

$$AS_{ij} = X\beta + e \dots\dots\dots (1)$$

Where,

$$X\beta = v \dots\dots\dots (2)$$

where AS_{ij} is the maximum utility attainable when alternative j is chosen by farmer i ; $X\beta$ is the deterministic component of the utility function, X is a vector of observable socio-demographic and economic characteristics, product-specific factors that influence utility, β is the unknown parameter vector to be estimated and e is the error term.

For empirical purposes, the expected utility of participation Y can be construed from a farmer’s observed binary choice of access and use of agricultural information, which implies a probit regression model is preferred (Anley *et al.*, 2007; Thuo *et al.*, 2012).

The explicit probit regression model is expressed thus:

$$Y = F(\omega + aX_i) = F(Z_i) \dots\dots\dots (3)$$

where Y is the discrete choice variable of access and use agricultural information, F is a cumulative probability distribution function, ω is a vector of unknown parameters, X is a vector of explanatory variables as in (1) and Z is the Z -score of the aZ area under the normal curve. The expected value of the discrete dependent variable in equation 2 is conditional on the explanatory variables, and also given as:

$$E[Y/X] = \int_0^1 [1-F(a'X)] + [F(a'X)] = F(a'X) \dots\dots\dots (4)$$

With the marginal effect of each explanatory variable on the probability of access and use agricultural information is given by:

$$(\partial E[Y/X])/\partial x = \phi(a'X)a \dots\dots\dots (5)$$

Where $\phi(\cdot)$ is the standard normal density function (Fufa and Hassan, 2006; Thuo *et al.*, 2012).

Following the above, the empirical model can be specified as:

$$Information_{access/use} = \beta_0 + \beta_1 Age + \beta_2 Sex + \beta_3 Edu + \dots\dots + \beta_n + \mu$$

Table 1. Description, measurement and hypothesized sign of variables used in the probit regression model

Variable	Description	Measurement	Hypothesized sign
Dependent Variable			
	Access to agricultural information	Yes =1, no = 0	+
	Use of agricultural information	Yes =1, no = 0	+
Independent Variables			
X ₁	Age of respondent	Years	+
X ₂	Sex of respondent	1= Male, 0= Female	+/-
X ₃	Education	Years in school	+
X ₄	Farm size	Acres	+
X ₅	Experience in farming	Years in farming	+
X ₆	Credit access	Yes =1, no = 0	-
X ₇	Farm ownership	Yes =1, no = 0	+/-
X ₈	Labour availability,	Yes =1, no = 0	+
X ₉	Household size,	Number of people	+
X ₁₀	Other work,	Yes =1, no = 0	+
X ₁₁	Cultivation of other crops	Yes =1, no = 0	+/-
X ₁₂	Access to market	Yes =1, no = 0	+
X ₁₃	Access to extension service	Yes =1, no = 0	+
X ₁₄	Group membership	Yes =1, no = 0	+/-
X ₁₅	Frequency of information access	Yes =1, no = 0	+
X ₁₆	Timeliness of information access	Yes =1, no = 0	+
X ₁₇	Understanding of language used for dissemination,	Yes =1, no = 0	+
X ₁₈	Importance of information disseminated	Yes =1, no = 0	+

Results and Discussion

The study sought to determine the factors influencing maize farmers accessing and utilizing agricultural information (Table 1.). The dependent variable, access to agricultural information is limited and therefore propels the use of the probit regression model. The independent variables included in the model were; age, sex, educational level, farming experience, farm size, land ownership, cultivation of other crops, timely information, importance of information, understanding of information, utilization of information, access to labour, access to credit, access to extension, FBO, access to market and maize yield. The probit regression results shows that land ownership, timely information, importance of information, understanding of information, utilization of information, access to labour, access to credit and access to extension influence farmers access to agricultural information in the study area (Table 2.).

The probit regression results shows a likelihood ratio chi-square value of 341.62 which is significant at the 1% level of significance. This means that the explanatory variables or factors included in the model jointly explained the decision to access agricultural information. The Pseudo R² value of 0.6456 also provides an indication that all the explanatory variables included in the model were able to explain about 64.5% of the probability of the decision of farmers to access agricultural information. Specifically, the analysis shows that land ownership, importance of information and utilization of information were significant at 1%. However, understanding of information was significant at 5%. Additionally, timely information, access to labour, access to credit and access to extension were significant at 10%.

Table 2: Factors influencing smallholder maize farmers' access and utilization of agricultural information

Variable	Coefficient	Std. Error	P> z
Age	0.006	0.019	0.727
Sex	-.226	0.240	0.347
Educational level	.003	0.020	0.873
Farming experience	.016	0.022	0.482
Farm size	-.040	0.046	0.388
Land ownership	.641***	0.222	0.004
Cultivation of other crops	-.368	0.243	0.131
Timely information	.626*	0.370	0.091
Importance of information	1.112***	0.370	0.003
Understanding of information	1.010**	0.382	0.008
Utilization of information	1.096***	0.300	0.000
Access to labour	.701*	0.363	0.054
Access to credit	-.594*	0.3141	0.059
Access to extension	.557*	0.268	0.038
FBO	.020	0.369	0.955
Access to market	-.012	0.290	0.966
Maize yield	.002	0.043	0.959
Number of observations		388	
LR chi2 (17)		341.62	
Prob > chi2		0.0000	
Pseudo R2		0.6456	
Log pseudo-likelihood		93.778762	

***, ** and * denote that the variable is significant at less than 1%, 5% and 10% respectively
Source: Field Survey Data, 2019

Conclusions

The study established that land ownership, timely information, importance of information, understanding of information, utilization of information, access to labour, access to credit and access to extension influence farmers access to and use agricultural information all had significant influence on access to and utilization of agricultural information. The study established that most farmers access information within and among themselves, hence Government and other stakeholders responsible for the provision of agricultural information should intensify training programme for lead farmers in the communities, since lead farmers always interact with fellow farmers in their various communities.

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