

Full Length Research Paper

Influence of FBO interaction with research and extension on the adoption of technologies by FBO members in the Central Region of Ghana

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Received 29 March, 2022; Accepted 22 July, 2022

The study examined the influence of Farmer Based Organization (FBO) interaction with research and extension service providers on the adoption of technologies by members of FBOs in the Central Region of Ghana. In conducting the study, a combination of purposive and convenient sampling methods was utilized in selecting the FBOs and other key players in the field. In all, the study covered 177 respondents. The approach utilized in the collection of data for the study was the quantitative research approach, thus questionnaire survey was the key method employed in the data collection. The quantitative data collected were analyzed statistically using the SPSS version 16 software. The findings revealed that there was a higher and more frequent interaction between members of FBOs and extension service providers and research institutions. The study further revealed that the majority of the FBO members who had interaction with both research institutions and extension service providers resulted in a higher contribution to the adoption of technologies. The study recommends that there should be continuous interaction between members of FBOs and extension service providers and research institutions, as this will help maintain the higher adoption of improved technologies and subsequently improved FBO's farm productivity.

Key words: Adoption, Farmer Based Organisations, technologies.

INTRODUCTION

The concept of research-extension-farmer-interaction is about bridging the gap in communication of research results to farmers. How well researchers, extension service providers, and farmer groups communicate and

cooperate has a strong influence on the adoption of technologies. According to Deneke and Gulti (2016), strengthening research and extension linkages should lead to a more effective interaction among the

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stakeholders in the agricultural sector to improve adoption and productivity. There is a direct linkage between technology adoption and the relationship existing between the providers of the technologies (Battistella et al., 2016), hence the interaction between researchers, extension service providers, and farmer groups is key for improved agricultural productivity.

The Research-Extension-Farmer *Linkage System* is crucial in the generation, development, dissemination, and utilization of research results. Azikiwe (2012) posited that an extension service that is not linked to research, farmers, and/or other service providers cannot be effective. For extension to succeed, it must enhance its linkages and networks with research, farmers, and extension service providers. If the linkages among the agricultural knowledge system actors are weak, the flow of information is hampered either from research to extension or from extension to farmers (Adesoji and Tunde, 2012). In spite of the importance of research, extension and farmer interaction to the transfer of technology, researchers have reported low levels of interaction between research-extension and farmers in problem-solving in many sub-Saharan African countries (Nyamupangedengu and Terblanche, 2016).

In Ghana, research-extension-farmer linkages are operationalized through joint technical review meetings which are attended by extension, research and technical departments of Ministry of Food and Agriculture (MOFA). These technical review meetings provide the necessary platforms for the introduction of new technologies to Subject Matter Specialists (SMSs), evaluation of specific technologies based on field experiences and solutions sought for farmers' problems. Also, operationalization of linkages is achieved through joint activities of technological development and delivery where researchers, SMSs, extension staff and farmers are involved. These include adaptive trials on the MOFA zonal research stations, on-farm trials carried out by SMSs and extension staff in collaboration with farmers and small plot demonstrations carried out on specific technologies by farmers and AEAs (CSIR-MOFA, 2013).

Government budgetary support to extension services delivery in Ghana has been declining since 2007; leading to weak interactions between researcher-extension and extension and farmers' interaction. Statistics from MOFA put 1 Agricultural Extension Agent (AEA) to 1,500 farmers, while some researchers maintain that the figure is about 1 AEA to 1,300 farmers (Anang et al., 2020). With this wide gap, smallholder farmers' access to innovations, technology transfer, and best agricultural practices to boost productivity is limited.

In lieu of the low extension-farmer ratio, extension service providers notably MOFA, have made FBOs focal points for extension delivery because extension delivery through groups is considered to be more efficient. According to Chang (2012), the formation of FBOs allows public extension agents to reach out to larger numbers of

farmers, especially given the inadequate number of extension agents in many developing countries. Salifu et al. (2012) refer to FBOs as the grouping of farmers mainly around common interest like the production, processing, storage and marketing of a given agricultural crop or to pool their resources together and facilitate access to credit and farm inputs. Chirwa et al. (2005) posit that for both the public and private sector, effective farmers' organisations present important opportunities such as: providing research and extension services to farmers and organising the purchase of inputs and sale of products on a more cost-effective basis; mobilizing resources for local development; and representing the interests and collective voice of farmers in development fora. According to Chang (2012), the formation of FBOs allows public extension agents to reach out to larger numbers of farmers, especially given the inadequate number of extension agents in many developing countries.

This study on FBO interaction with research and extension with regards to technology adoption was guided by Rogers' adoption diffusion theory developed in 1995. The Adoption Diffusion theory explains why farmers choose to adopt new ideas. The theory emphasizes four main interacting elements as espoused by Rogers (2003) namely (1) an innovation, (2) communicated through certain channels, (3) over time and (4) among members of a social system.

The theory has been used in agricultural extension by extension program planners, evaluators and researchers to develop an understanding of the reasons why extension programs result in adoption or rejection of a particular new practice. It also provides a general understanding of the impact of extension programs through the extent/degree of innovation adoption.

The research problem

Numerous studies have reported on poor interaction between research, extension and farmers in many developing countries (Deneke and Gulti, 2016; CSIR-MOFA, 2013). Smallholder farmers access to innovations, technology transfer and best agricultural practices to boost technology adoption/productivity has therefore been limited. Deneke and Gulti (2016) have recommended the strengthening of research and extension linkages to bring about a more effective interaction among the stakeholders in the agricultural sector to improve adoption and productivity.

FBOs in the Central Region, like in other regions of Ghana, employ different extension systems to meet the needs of member farmers. The extension systems practised range from the top-down approaches (Technology transfer) to more participatory approaches such as Farmer Field School (FSS) and Farmer Field For a (FFF). Although research, extension and farmer



Figure 1. A map of the study areas.

Source: Cartographic and Remote Sensing Unit, Department of Geography and Regional Planning, University of Cape Coast.

interaction is a key characteristic of the extension systems practiced in the Central Region, there is limited evidence on the status of FBO interaction with research and extension on adoption of technologies. In the light of the aforementioned, the study sought to answer the question: is there any relationship between the interaction among FBOs, researchers and extension service providers and the adoption of technologies by FBO members in the Central Region of Ghana?

METHODOLOGY

A descriptive survey design was used to collect cross-sectional data from different FBOs in the study area. The target population included all the registered agricultural FBOs and selected staff of extension service providers and researchers operating in the Central Region. A multi-stage sampling procedure was used to select the study sample from the target population structures which were dispersed. At the first stage, five (5) municipal and district assemblies (Effutu Municipal and the Abura-Asebu-Kwamankese, Asikuma-Odoben-Brakwa, Gomoa East, and Twifo-Hemang-Lower-

Denkyira Districts) were purposively selected from the list of twenty (20) in the Central Region. The five administrative jurisdictions were selected because of the concentration of active FBOs in the areas (Figure 1).

At the second stage, five (5) FBOs were purposively selected from the five (5) municipal and district assemblies. This was to ensure that: (i) FBOs with numerical strength of 40 and above were selected and (ii) FBOs were identified with various extension systems. At the final stage, 199 out of 1986 FBO members were randomly chosen from the selected FBOs to constitute the desired study sample size. The stratified method was used in the selection of the farmers. The number of farmer-respondents was proportionately selected among the five FBOs. Out of the 199 respondents chosen 177 were successfully interviewed. A summary of the sampling of the farmers is shown in Table 1.

The face-to-face interview approach was employed to administer structured questionnaires to farmer respondents to ensure that the chosen subjects themselves provide the information in the quickest time.

Descriptive statistics (frequencies, percentages, means and tables) was used to analyze the data. Cross tabulations of variables were done and a Chi-square test was used to establish if any significant relationship exist between the variables. Statistical Package for Social Sciences (SPSS) version 16 was the statistical

Table 1. Study population and sample size of farmers.

FBO	Total membership	Sample size (%)	Total sample size	Respondents reached
CAA	151	50	76	42
CIGMA	749	10	75	38
WONSOM	50	100	50	30
OPOA	986	10	97	31
Potato	50	100	50	36
Total	1986	-	199	177

Source: Authors.

software used to analyze the collected data.

RESULTS AND DISCUSSION

Socio-demographic characteristics of respondents

The relevant socio-demographic variables of respondents that this research covered included age, gender, level of education and FBO members experience (years) and economic activity. These are shown in Table 2.

Table 2 shows that males dominate the FBO membership (59.3%) while about 41% were female. Most (37.8%) members of the FBOs were in the age bracket of 51-60 years while 21.5% were in the age bracket of 41-50 years implying that majority (59.2%) of the FBO members were in the age bracket 41-60 years. This reflects the fact that majority of the FBO members in the central region are the aged. The results also show that majority (59.2%) of the respondents had primary education (JHS/MSLC). Only 4.6% of the respondents had tertiary education. In terms of FBO experience 53% of the respondents had been involved in FBO activities for 3-5 years; 27% for 5-10 years; 3% for over 10 years; and 15% for 2 or fewer years.

Percentage distribution on the interaction of FBO members with research and extension

The objective of this study was to ascertain the FBO members' interaction with research and extension. This was operationalized based on the frequency, and mode of interaction of FBOs with research and extension. The results are presented in Table 3.

Frequency of interaction of FBOs with research and extension

From Table 3, 34.5% (61) of the FBO members indicated that they had interaction with research institutions. Out of the 61 (34.5%) farmers who had interaction with research institutions, 27 (about 44%) indicated that the frequency

of interaction was very often and 47.5% indicated the interaction was often. Only 5 and 3% rated the interaction as occasionally and rarely, respectively.

Table 3 also shows that 97% (171) of FBO members interacted with extension service providers. The frequency of interaction with extension providers was rated very often (45%) and often (43%), respectively. This finding indicates that the majority of the FBO members (91.8%) who interacted with research institutions described the frequency of interaction as very often and often.

Contribution of interaction to technology adoption

Farmer interaction with research and extension is important if farmers are to adopt improved technologies for their agricultural production activities. Data were collected from FBO members (farmers) to determine the contribution of interaction to technology adoption. Table 4 indicates that 49 farmers representing 80% often had interaction with research institutions 151 farmers representing 88.3% often had interaction with extension service providers.

The influence of interaction with research and extension institutions on adoption of technologies by FBO members

The fundamental question for this study was: What is the influence of FBOs interactions with research and extension institutions on adoption of technologies by FBO members? The Chi-square statistics was used in testing for the relationships among the study variables.

Interaction between research and the FBO members on adoption of technologies

Data were collected from FBO members to determine the relationship between the interaction and the FBO members' adoption of technologies.

Table 2. Socio-demographic characteristics of FBO members.

Variable	Frequency	Percentage
Gender		
Male	105	59.3
Female	72	40.7
Total	177	100
Age (years)		
Below 20	0	0
20-30	12	6.8
31-40	28	15.8
41-50	38	21.5
51-60	67	37.8
Above 60	32	18.1
Total	177	100
Level of education		
No formal education	48	27.6
JHS/MSLC	103	59.2
SHS/GCE.O Level	15	8.6
Tertiary education	8	4.6
Total	177	100
FBO members experience (years)		
0-2	27	15
3-4	95	53
5-10	49	27
>10	6	3
Total	177	100
Economic activity		
Petty trading	137	77.5
Public services	11	6.2
Transport business	7	3.8
Others	22	12.5
Total	177	100

Source: Authors.

The finding in Table 5 shows that, out of the 61 FBO members who had interaction with research institutions, 80% of them indicated that their interaction with research had a high contribution to the adoption of technologies, 12% of the respondents indicated the contribution of the interaction to the adoption of technologies was low and only 8% of the respondents indicated that its contribution to the adoption of technologies was moderate.

The Chi-square results recorded ($\chi^2 = 14.258$, $df=6$, $p = 0.027$), found a significant relationship between the interaction and adoption of technology. This suggests that the interaction between the research and the FBO members is related to the adoption of technologies by FBO members.

Interaction between extension service providers and the FBO members on adoption of technologies

Data were collected from FBO members to determine the relationship between the interaction and the FBO members' adoption of technologies.

The finding in Table 6 shows that, out of the 151 FBO members who had interaction with extension providers, 88.3% of them indicated that their interaction with extension providers had a high contribution to the adoption of technologies, 3.5% of the respondents indicated the contribution of the interaction to the adoption of technologies was low and only 8.2% of the respondents indicated that its contribution to the adoption

Table 3. Percentage distribution on the interaction of FBO members and researchers and extension providers.

Variable category	Research		Extension	
	Freq.	%	Freq.	%
FBO interaction with Institution				
Yes	61	34.5	171	96.6
No	116	65.5	6	3.4
Total	177	100	177	100
Frequency of FBO members interaction with Institution				
Very often	27	44.3	80	45.2
Often	29	47.5	76	43.0
Occasionally	3	4.9	12	6.8
Rarely	2	3.3	9	5.0
Institutions FBOs members interacted with				
CSIR	30	49.3	-	-
University	18	29.4	-	-
Agricultural Research Station	13	21.3	-	-
MOFA/MOAP/Fruittiland	-	-	34	20.0
Cocoa Abrabopa	-	-	40	23.4
MOFA/MIDA	-	-	30	17.5
Twifo Oil Palm Plantation	-	-	31	18.1
MOFA/RTIMP	-	-	36	21.0
Total	61	100	171	100
Contribution of interaction to technology adoption/usage				
Low/Rarely	7	11.5	6	3.5
Moderate/Sometimes	5	8.5	14	8.2
High/Always/Often.	49	80	151	88.3

Source: Authors.

Table 4. Contribution of interaction to technology adoption.

Contribution of interaction to technology adoption/usage	Research		Extension	
	Freq.	%	Freq.	%
Low/Rarely	7	11.5	6	3.5
Moderate/Sometimes	5	8.5	14	8.2
High/Always/Often	49	80	151	88.3
Total	61	100	171	100
Frequency of FBO members interaction with Institution				
Very often	27	44.3	80	45.2
Often	29	47.5	76	43.0
Occasionally	3	4.9	12	6.8
Rarely	2	3.3	9	5.0

Source: Authors.

of technologies was moderate. The Chi-square results recorded ($\chi^2 = 97.043$, $df=6$, $p = 0.000$), found a highly

significant relationship between the interaction and its contribution to technology adoption. This suggests that

Table 5. Contribution of interaction to technology adoption.

Frequency of interaction with research institution	Contribution of interaction to technology adoption							
	Low		Moderate		High		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Very often	2	29	1	20	24	49	27	44.3
Often	3	43	2	40	24	49	29	47.5
Occasionally	1	14	1	20	1	2	3	4.9
Rarely	1	14	1	20	0	0	2	3.3
Total	7 (12)	100	5 (8)	100	49 (80)	100	61 (100)	100

Figure in parenthesis are percentages.
Source: Authors.

Table 6. Relationship between the interaction and adoption of technologies by FBO members.

Frequency of interaction with extension service providers	Contribution of interaction to technology adoption							
	Low		Moderate		High		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Very often	0	0.0	3	21.4	77	51.0	80	46.8
Often	1	16.7	4	28.6	71	47.0	76	44.4
Occasionally	3	50.0	6	42.9	3	2.0	12	7.0
Rarely	2	33.3	1	7.1	0	0.0	3	1.8
Total	6 (3.5)	100	14 (8.2)	100	151 (88.3)	100	171	100

Figure in parenthesis are percentages.
Source: Authors.

the interaction between the extension service providers and the FBO members is highly related to the adoption of technologies by FBO members

Conclusion

The majority of the FBO members highly interacted with research institutions and extension service providers and this resulted in a higher contribution to the adoption of technologies. Based on the findings, the study recommends that there should be continuous interaction between members of FBOs and extension service providers and research institutions. This will help maintain the higher adoption of improved and subsequently improved FBO farm productivity.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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