Application of Statistical Tools in Assessing the Performance of Farmers Training Centre's

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Research Article

Abstract: Agriculture plays a vital role in Ethiopian economy which accounts for about 41% Gross Domestic Product and 75% of export earnings. However, it is characterized by subsistence farming system using backward traditional farm tools, with low productivity. Farmers need improved skills, information, and ideas in order to develop the agriculture. Federal government took various measures and emphasis has been given in the current five year 'Growth and Transformation Plan (GTP)' to enhance agricultural transformation and rural development with strategy of human resource development to create modern farmers and using new improved agricultural technology. The establishment of farmers training centers (FTCs) is one of the strategies to deliver effective extension service for rural farmers. However, the responsible bodies do not know the real performance of FTCs in the study district. Hence, this paper examines the performance of FTCs in agricultural development and the factors responsible for success or failure. To address the objectives, both primary and secondary data have been used and primary data have been collected through semi-structured interview schedule from 210 sample farmers identified from 6 FTCs by proportionate random sampling technique. The collected data was analyzed with descriptive statistics like frequency, percentages, mean, and standard deviation. Chi-square tests (χ^2) were used to test the significance of each variable with respect to the performance of FTC based extension services. In addition, Multiple Linear Regression model was employed to identify the factors that affect the performance of FTCs in agricultural development. The analysis results show that the extension services delivered by FTCs in the study area were effective for acceptance of technologies. Also the services of FTCs have a significant contribution to increase the production and changed the farmers' livelihood. However, FTCs in the study district were not well performed as expected due to many hindering factors. Based on the findings, appropriate policy measures have been forwarded.

Key words: Agriculture, Farmers Training Centres, Performance, Statistical Tools, Effectiveness.

1. Background and Rationale

Ethiopia is one of the largest countries in Africa both in terms of land area (more than 1.2 million square km) and with a population of 84 million; and it is predominantly an agrarian country with the vast majority of its population directly or indirectly being involved in crop and livestock production. More than 80% of population is living in rural areas engaging in agriculture for its livelihoods. Hence, agriculture plays a vital role in Ethiopian economy which accounts for about 41% Gross

Domestic Product and 75% of export earnings (BoAD, 2012). Available evidences indicate that peasant agriculture in Ethiopia is characterized by subsistence farming system using backward traditional farm tools and farming practices, with low productivity and unable to produce sufficient amount of food for the country's rapidly growing population. Various factors can be cited for slow growth of agriculture, such as the trend of conventional farming system as a result of poor extension service coupled with climatic change, reduced soil fertility, recurrent and prolonged drought, weak agricultural research base, inadequate financial service, poor infrastructure and market service, environmental degradation and fragmentation of land holdings 2008 as cited in Wuletaw, 2010). (EPLAUA, Furthermore, lack of improved technologies, low adult literacy ratio and inappropriate training system had been contributed for slow growth of agriculture (BoARD and SWHISA, 2006; Taddesse, 2007 as cited in Wuletaw, 2010). In order to increase the production and productivity of agriculture, the use of modern agricultural technologies are vital, out of which fertilizer and high yielding variety of crops are the most important to increase the level of crop production (Mesfin, 2005). In Addition to this, capacitate the farmers with these new and modern ways of farming systems also the main instruments of agricultural development. Agricultural change and development requires mobilization of human resource through such means as education and technical training. People involved in agriculture need improved skills, information, and ideas in order to develop the agriculture that will meet complex demand patterns, reduce poverty and preserve or enhance ecological resources. agricultural extension in Ethiopia has been given less attention though it has an important role to play (Fisseha, 2009). Agriculture in Ethiopia had not been open to outside information due to many factors and consequently, its technological progress has been restrained for a long time. It is a fact beyond dispute that technology can play an important role in increasing production, income and efficient use of resources for the

economic development of the country (Tsegaye, 2003). Currently the main policy of Ethiopian government is Development Lead 'Agricultural Industrialization (ADLI)'. It has been indicated in the current five year 'Growth and Transformation Plan (GTP)' of the country. The plan wants to enhance agricultural transformation and rural development with strategy of human resource development to create modern farmers and using new improved agricultural technology. To realize the implementation the strategy envisaged, the Federal Government took measures to design a clear cut strategy at country level. The establishment of farmers training centers (FTCs) is one of the strategies to deliver effective extension service for rural farmers in each Peasant Association (PA) since 2004 (MoARD, 2009). About 18 thousand FTCs were planned to be established throughout the country (Habtemariam, 2007 as cited in Wuletaw, 2010). One FTC at each PA which serves as, center of information, extension, demonstration, place where modular trainings are given, source of advice for the transfer of improved technologies, knowledge acquisition, area of linkage between research, extension and technology users, and other institutional support services. Across the country 6543 FTCs have been established till 2009 in each rural PA (MoARD, 2009). In Southern Nations and Nationalities of People Region, 2789 FTCs were established from the expected 3760 FTCs and 1658 number of FTCs started to deliver the extension service for the farmers (BoAD, 2012). In the study district 29 FTCs have been established and some are (16) delivered their service for the farmers. Beside establishment and functional activities of the centers, there is no any understanding about the impact and effectiveness of those FTCs on the rural farmers. The main reasons for establishment of such FTCs were for making all farmers in their PA skillful and knowledgeable by giving training service in the centers as well as support directly to apply the skills and knowledge on their farm land. In addition, the centers should serve as a bridge for technology transformation from the research center to the farmers as well as they should be information dissemination center and consultancy service delivery institution. In general, the FTCs were established for an effective extension service delivery for all farmers living around the centers to achieve the country's development plan under agricultural sector. However, the responsible bodies do not know the real performance of FTCs that how much the centers contributed for agricultural development by making the farmers skillful and knowledgeable. How many farmers, advantageous with the centers training in the farm practice? What type of information and how many farmers are the user of this information and the contribution of this information in the livelihood of farmers is not known in the district. Even no one knows about the real performance in technology transformation and promotion of technology adoption in the study area. Specifically, in the study district, performance of the FTCs has not been studied empirically and assessed in depth for taking appropriate action in time. Also the FTCs are lacking information regarding their performance gap due to dearth of studies. In addition, multiple factors are responsible for success and failure of these FTCs. Therefore, this paper examines the performance of FTCs in agricultural development and the factors responsible for success and failure by applying the statistical tools to arrive meaningful inference.

2. Objective of the Research

The overall objective of this research paper is to assess the performance of FTCs in relation to agricultural development by applying appropriate statistical tools. In line with this, the specific objectives are.....

- To analyze the effectiveness of FTCs in achieving their goals
- To evaluate the contribution of FTCs for agricultural development in the study area
- To assess the performance of FTCs in developing skillful and knowledgeable farmers with modern way of agricultural practice.
- To investigate the factors affecting the performance of FTCs in the study area

3. Research Design

This research paper is based on empirical survey encompassing both qualitative and quantitative data. A multi-stage sampling procedure was used to select the respondents. In the first stage, Sankura district was selected purposively because according to zonal agricultural development department, more FTCs are functioning in this district and dearth of studies regarding effectiveness of FTCs. In the second stage, all 29 FTCs in the district were categorized in two i.e. functional and non-functional and only functional FTCs (16) were considered for the study purpose. In the third stage, functional FTCs (16) have been stratified into three categories in terms of high, medium and weak, according district Agricultural Development Offices to measurements. From each category, two FTCs were selected randomly to make representation. In the selected 6 FTCs, there are 3289 farmers have registered and to arrive the sample size the author has tried to adopt different formulae such as Cochran, (1977), Taro Yemane (1970), and Kothari (1990) etc. But, the sample size becomes more than 300; which is difficult to manage within limited time and resources. Hence, Carvalho (2005) sample size table was adopted to arrive the sample size. Thus, the medium size of 200 units was selected as

respondents. Additionally, with 5% contingency, the sample size becomes 210. Finally, the sample farmers have been identified by proportionate random sampling technique. Both primary and secondary data were used and primary data was collected through semi structured interview schedule and the secondary data was collected from the responsible offices. The collected data were coded, entered and analyzed by using Statistical Package for Social Science (SPSS, version 20) software. The quantitative data was analyzed with descriptive statistics

like frequency, percentages, mean, and standard deviation. Chi-square tests (χ 2) were used to test the significance of each variable with respect to the performance of FTC based extension services for contribution of agricultural development. In addition, Multiple Linear Regression model which best fits the analysis for a determinant factor that affects the performance of FTCs in agricultural development was employed.

4. Conceptual Frame work

In this paper, effort has been made to identify the factors affecting the performance of FTCs in agricultural development through literature, practical situations and field observation.



Figure 1: Conceptual framework

The conceptual framework of this study is based on the assumption that the agricultural development is influenced by the performance of FTCs through creation of skillful and knowledgeable farmers, promoting the adoption of new technologies, access to agricultural information, giving consultancy services to the farmers, providing effective extension services and creates close relation with local research centers. The conceptual frame work presented in figure 1 presents the most important variables assumed to influence the agricultural development through the performance of FTCs.

5. Major Findings

5.1 The effectiveness and contribution of FTCs on Agricultural Development

To indicate the relationship between selected indicator variables with the outcome variables, it is important to evaluate the effectiveness of extension services and their contribution on agricultural development. The selected indicator variables determined by the FTC based extension services are training, information and consultancy services and also the outcome variables expressed as practicing modern farming systems, accepting new technologies and amount of production change. The significant associations are indicated by chi-squire and p values with percentage results.

5.1. The effectiveness of FTC based extension services on practicing modern farming

Practice is operationalized as the application of knowledge acquired from the training. It is the transfer of learning. Practices of farmers were evaluated based on their responses on the application of recommended technologies. Selected extension related services that delivered by FTCs, which are determined by training, activities, experience sharing, technical visiting assistance, information and consultancy services. The chisquire results showed that, all 8 selected variables related to FTCs based extension services are significantly associated with modern practices in the study area. As the results (table 1) indicate, 39% of the trained farmers have practiced modern farming systems in their farm land and a small percent (5.7%) untrained farmers were practiced modern farming systems at 5% significant level. This shows that more trained farmers practicing modern farming systems than untrained farmers. This indicates that training services delivered by FTCs to practice modern ways of farming systems is satisfactory.

Practice of modern ways of farming sys					ning system in %		
FTC based e	xtension services		Practiced	Not practiced	Total	Chi square (x ²)	P value
Training Trained Untrained Untrained		Trained	39.0	27.1	66.2		
		Untrained	5.7	28.1	33.8		
Total			44.8	55.2	100.0	33.674	.000*
Visiting of	Visito	ors	29.5	9.5	39.0		
demonstrati on field	Non vis	itors	15.2	45.7	61.0	51.776	.000*
	Total		44.8	55.2	100.0		
Experience	Experience Participant		27.1	13.8	41.0		
sharing activities	Non participant		17.6	41.4	59.0	27.272	.000*
	Total		44.8	55.2	100.0		
Promote	Promo	ted	41.0	27.1	68.1		
suitable new improved technologies	Not promoted		3.8	28.1	31.9	42.868	.000*
	Total		44.8	55.2	100.0		
Recent mar	ket information	Have Access	6.7	0.5	7.1	15.413	
		No access	38.1	54.8	92.9		.000*
	Total		44.8	55.2	100.0		
Access to tec	hnical assistance	Technically assisted	25.7	14.8	40.5		
		Not assisted	19.0	40.5	59.5		
Total		44.8	55.2	100.0	20.342	000*	
	Trained		37.6	13.8	51.4	20.342	.000
Not trained		1.4	12.9	14.3			
	Total		39.0	26.7	65.7		
		Supported	39.0	30.0	69.0	_	
DAs	support	Not supported	5.7	25.2	31.0	26 335	000*
	Total		44.8	55.2	100.0	20.335	.000 *

Table 1: Association between selected FTC based extension services and modern practice

Note: * significant at 5% level

Preparing for visiting demonstration fields by the centers also has a significant relationship with application

of modern ways of farming systems. Out of 39% sample farmers those visited demonstration fields, 29% of them

were applied modern ways and only 9.5% not practiced. But, out of 61% non visitors, majority (45.7%) of them were not applying modern ways of farming systems. Hence, there is a significance relationship between visiting demonstration fields and practice in the study area. This indicates that the arrangement of demonstration field activities is effective and contributed to modern farming systems. One of the variable significantly associated with modern farming practicing in the study area is experience sharing. According to the survey result, 27.1% of the farmers from those (41%) who were participated in experience sharing activities were practiced modern ways of farming systems. But, from those (59%) respondents who were not participated in experience sharing activities, majority (41.4%) of the respondents were not applying modern systems. According to the chi-squire values in the table 1, promotion of new improved technologies in the centers which are suitable to local conditions is significantly associated with applying modern farming practices. That is, majority (41%) of sample farmers practiced modern farming systems when FTCs in the study area promote new improved technologies. This shows that promotion of technologies at the FTCs is important to apply modern farming practices. Farmers who have an access of technical assistance to market oriented are highly associated with modern practices. The study found that those (40.5%) who have an access of technical assistance for market orientation, majority (25.7%) were practiced. This shows that the extension service of FTCs related to technical assistance were highly affected the decision of rural farmers in practice of modern systems. Also, practical training is one of the significant associate variables with modern practices in the study area at 5%significance level. Out of (51.4%) practically trained sample farmers, 37.6% of them were applying compare to others (12.9%). This indicates that practical training is an important variable to practice modern farming systems. Further extension agent's direct support is highly associated with modern farming practices. Survey results indicate that 39% of sample farmers practiced modern farming systems due to DAs direct support and 30% was not practiced. Out of the non supported sample farmers only 5.7% were practiced but majority (25.2%) was not applying. This indicates that DAs direct support to the farmers is an important activity to apply modern systems. The overall extension service variables indicate that, there are significant relationships with modern ways of farming systems.

5.1.2 The effectiveness of FTC based extension services

on technology/inputs/ acceptance

Technology adoption expressed as changing the working culture and attitude of the society to improve the income and living standard with capable of comparing different technologies and select for adoption of most production technologies. The relationship between selected subject matter variables with accepted of technologies/inputs will show the effectiveness and contribution of those activities in the study area. Selected extension services delivered by FTCs, are training, experience sharing, access to technical assistance, access to different information, selection of technologies, participation of rural farmers in technology selection and testing activities. The chi-squire and p values indicate the significance of each variable related to adoption of technologies. According to the chi-squire and p values (table 2), the selected 10 variables related to FTC based extension activities are significantly associated with acceptance of technologies/inputs/. Results show that most (55.7%) of the trained farmers and a small number (4.3%) of untrained farmers enhanced in accepted technologies. The high level of significant difference at less than 1% probability level indicates that trained farmers are better technology users than untrained farmers. The probable reason might be the effective training brings know how towards the technology. This area of human resource development is quite pertinent for improvement of the quality of life of the farming community. The result also indicates that participation in experience sharing activities was highly associated with uses of technologies at less than 5% significance level. 35.2% of participants in experience sharing activities were accepted technologies. Whereas out of 59% of non participants, majority (34.3%) were not accepted technologies promoted by FTCs. This shows that participating in experience sharing activity prepared by FTCs are significantly affects the acceptance of technology in the study area. Also the technology promotion activity of FTCs has a significant relationship with technology acceptance. Out of 68.1% sample farmers, majority (50.5%) of them was decided to use those technologies when FTCs promoted new improved technologies which are suitable to local conditions. But, from 31.9% of sample, 22.4% were not when FTCs not promoted suitable technologies. The result indicates that promotion of suitable technologies is an important activity for acceptance of technologies. Information such as weather and markets are significantly related with technology using and the result indicates that, 1.9% and 6.2% farmers accepted technologies.

FTC based extension services	Acceptance of technologies in %				Chi square (x ²)	P value
	Accepted	Not accepted				
Training	Trained	55.7	10.5	66.2	100.095	.000*
	Untrained	4.3	29.5	33.8		
Total	60.0	40.0	100.0			
Experience sharing	Participate	35.2	5.7	41.0	41.170	.000*
	Not participate	24.8	34.3	59.0		
Total	60.0	40.0	100.0			
Promoted new suitable improved technologies	Promoted	50.5	17.6	68.1	37.265	*000
	Not promote	9.5	22.4	31.9		
Total	60.0	40.0	100.0			
Access to weather condition information	Accessed	1.9		1.9	2.718	.099**
	Not accessed	58.1	40.0	98.1		
Total	60.0	40.0	100.0			
Access to get recent market information	Accessed	6.2	1.0	7.1	4.786	.029*
	Not accessed	53.8	39.0	92.9		
Total	60.0	40.0	100.0			
Get technical assistance to produce market oriented productions	Technically assisted	35.7	4.8	40.5	47.435	*000
	Not assisted	24.3	35.2	59.5		
Total	60.0	40.0	100.0			
	Trained	45.2	6.2	51.4		
	Not trained	10.5	3.8	14.3		
Total	55.7	10	65.7			
Technologies considered the social and economical conditions	Considered	36.2	9.0	45.2	28.913	.000*
	Not considered	23.8	31.0	54.8		
Total	60.0	40.0	100.0			
Participation in technology selection activities	Very strong	0.5		0.5	52.005	.000*
	Strong	10.0		10.0		
	Medium	20.0	1.4	21.4		
	Poor	29.5	38.6	68.1		
Total	60.0	40.0	100.0			
Participation in technology testing activities	Very strong	1.9		1.9	39.404	*000
	Strong	7.1		7.1		
	Medium	17.6	1.9	19.5]	
	Poor	33.3	38.1	71.4	1	
Total	60.0	40.0	100.0			

Table 2: Association between selected FTC based extension service and acceptance of technologies

Note: *, ** indicate Significant at 5% and 10% level

The study found that, from those (40.5%) who technically assisted by the centers to produce marketable products, majority (35.7%) of them were accepted new technologies and also more (35.2%) of not technically assisted sample farmers were not. This indicates that the technical assistance of FTCs to produce marketable products was highly affected the decision to accept new technologies. Practical method of training is one of the significant variables that highly associated with decision to accept technologies. Among who are practically trained, majority (45.2%) of them have accepted different technologies than others. This shows that, practical method of training was affected the use of technologies.

Selection of technologies by FTCs also significantly associated with technology acceptance. Majority (36.2%) of the farmers have accepted technologies which are considered to the social and economic conditions of the expected community. It has a significant effect on technology acceptance in the study area. The chi-squire result indicate that, participation of sample households in technology selection and testing activities in the centers highly affected the decision of sample farmers to use new improved technologies. Respondents were participated in the two activities at very good, good and medium levels, majority (30.5% & 26.6%) of them were accepted technologies. This indicates that participation of farmers

in technology testing and selection activities were important to accept technologies.

Generally, results show that the selected 10 types of extension services delivered by FTCs in the study area having contribution to accept technologies/inputs. This means that the extension services delivered by FTCs in the study area were effective for acceptance of technologies.

5.2.1 The contribution of FTCs' extension service on production

The relationship between FTCs based extension services and production amount is important to identify the contribution of the centers in agricultural development. Production amount measured as the total amount of production produced by sample respondents in 1 hectare of land within one production year. The chisquire values indicate that, 8 variables have significantly related with production amount. Training related activity is one of the significant variables that can affect the amount of production at 5% significance level. 34.8% of trained farmers were produced above 76 quintals but majority (29.5%) untrained sample farmers produced below 76 quintals. This shows that there is significance difference in the production amount between trained and untrained farmers. This indicates that training service is an important activity for farmers to produce more production.

FTC based extension services					t of total p	roduction p	Chi square (x ²)	P value		
				14-45	45-76	76-107	>107	Total		
Training			Trained	8.1	23.3	22.9	11.9	66.2	32.686	
8		Unt	rained	5.2	24.3	2.9	1.4	33.8		.000*
Total				13.3	47.6	25.7	13.3	100.0		
Experience sharing	activitie	s	Participated	5.2	10.0	17.6	8.1	41.0	37.986	
•		Not par	rticipated	8.1	37.6	8.1	5.2	59.0		.000*
	Total			13.3	47.6	25.7	13.3	100.0		
Weather information	n		Accessed		0.5		1.4	1.9	13.660	
		Not a	ccessed	13.3	47.1	25.7	11.9	98.1		.003*
	Total			13.3	47.6	25.7	13.3	100.0		
Technology adoption	1		Adopters	3.3	21.0	23.3	12.4	60.0	58.816	.000*
		Non a	adopters	10.0	26.7	2.4	1.0	40.0		
Total		13.3	47.6	25.7	13.3	100.0				
			Accessed		0.5	3.3	3.3	7.1		
Market information		Not a	ccessed	13.3	47.1	22.4	10.0	92.9	24.062	.000*
	Total			13.3	47.6	25.7	13.3	100.0		
DAs support			Supported	5.2	27.1	23.8	12.9	69.0		
									42.226	.000*
		No	ot supported	8.1	20.5	1.9	0.5	31.0		
	Total			13.3	47.6	25.7	13.3	100.0		
Technical	Tech	nically	assisted	1.0	16.2	12.4	11.0	40.5		
assistance									36.149	.000*
	No	ot assiste	ed	12.4	31.4	13.3	2.4	59.5		
	Total			13.3	47.6	25.7	13.3	100.0		
Applicati	A	Applied		0.5	7.6	23.3	13.3	44.8	133.394	.000*
on of										
modern										
practice										
	Not ap	plied		12.9	40.0	2.4		55.2		
Total		13.3	47.6	25.7	13.3	100.0				

Table 3: Association between FTC extension services with production

Note: * Significant at 5% level

The association between experience sharing activities with amount of production is significant at 5% level and from 41% participant farmers in experience sharing activity, 25.7% were produced above 76 quintals, however majority (45.7%) of non participant farmers produced below 70 quintals. This infers that farmers those participated in experience sharing activities were produced more amount of production than non-participated. Even though the agricultural information

service delivery of sample FTCs were very poor, access to agricultural information has a significant relationship with agricultural production in the study area. As table 3 results indicate, farmers having an access of weather and market information, majority (1.4% and 6.6%) of them were produced above 76 quintals. Whereas, more (60.4%) farmers not having access of information from the centers produced below 76 quintals. This shows that the provision of weather and market information has a

contribution on agricultural production. According to the chi-squire values in the table 3, technology adoption is one of the significant variables associated with production amount. That is, majority (35.7%) of sample farmers produced beyond 76 quintals and 21% produced between 45-76 quintals. This indicates that adoption of agricultural technologies have a great impact on production amount. The extension agents' support also has a significant relationship with agricultural production. 36.7% of sample farmers produced above 76 quintals were supported by extension agents. This shows there is significance difference between supported and unsupported sample farmers in the production amount. Technical assistance was significantly associated with production amounts. Out of (40.5%) technically assisted farmers, majority (23.4%) of them produced above 76 quintals and 16% produced between 45-76 quintals. Farmers applying modern practice produced above 76 quintals are 36.6%. But, majority (52.9%) of the farmers was not applying modern practice in their farm land produced below 76 quintals. This shows an application of modern practice has a strong contribution for among of production. The overall results indicate that selected FTCs based extension services have a significance relationship with amount of agriculture production. Services such as training, visiting activity, access to information, support of extension agents, technical assistance and application of modern practice have a significant contribution to production amount.

5.2.2 The contribution of FTC based extension services on income and living condition

To identify the contribution of FTC based extension services on income and life change of rural farmers, it is essential to understand the income and life condition before and after the service delivery of FTCs in the sample PAs. However, the sample farmers have no statistical data of their income level change in terms different indicators like food intake, health status, living standard and so on. Therefore, the author measured the same in qualitatively and results (table 4) indicate that, majority (51%) sample farmers expressed that the income gained from their agricultural activities has increased due to FTC based extension intervention. Also 23.3% opined that mainly the FTC based extension services contributed for change of their life condition. According to their view, due to the above services they adopted different new technologies and applied integrated agricultural activities in a modern way. As a result, they produced more, their participation in different development activities were increased, saving habit changed and also the eating, wearing and living conditions. However, 25.7% of sample farmers revealed there is no change in their life situation due FTC extension services.

Fable 4: Res	pondents per	ception on co	ontribution	of FTC	based	extension	services	on income	and life co	ndition
	1 1	1								

Types of Features	No. of Respondents	Percentage
Income change	107	51
Life condition change	49	23.3
No change	54	25.7.
Total	210	100.0
Source: 1	Field survey, 2013	

5.3 Linear Multiple Regression model output

In the preceding sections, variables which can affect the performance of FTCs in relation to training, technology transfer, information and consultancy services were identified. However, through ordinary least square procedures, the author considers the combined effect of variables. Therefore, the emphasis is on analyzing the variables together, we are able to incorporate important information about their relationship. Thirteen variables were hypothesized to explain factors affecting the FTCs based extension services viz. training, information, consultancy and technology transformation and so on. In addition, the extension services by itself that can affect the performance of FTCs were also included in the model analysis. Before running the model, multi colinearity test was carried out and not found any problem.

5.3.1 The effect of selected explanatory variables on the performance of training activities

Linear Multiple Regression results indicate that performance of training delivered by FTC being affected by a number of factors. In the analysis, 15 independent variables were entered. As indicated in table 5, 7 of them were statistically significant at 5% and 10% levels. The \mathbf{R}^2 value of the model is 0.438 reveals more than 43.8% of variation upon dependent variable is explained by the independent variables. Age of the farmers, distance of FTCs from farmers' residence, farmers' participation, improved technologies, skill and promoting new knowledge of Development Agents (DAs), poor monitoring and evaluation as well as lack of demonstration fields are the important factors significantly affects the performance of training delivered by FTCs. As the result of OLS indicates, Age of the respondent and training activity of FTCs are positively related at 10% significant level. Assuming other variables constant, a unit age increase of farmer would increase the

performance of FTCs training delivery by 0.003 units. This shows that, one year the sample farmers' age increment improves the performance of training service delivery of FTCs in the study area. Performance of FTCs training service and FTCs distance from the farmers' residence are negatively related at 5% significance level which means one unit increase on FTCs distance from the farmers' residence would reduce the performance of training delivered by 0.06 units. This means FTCs distance from residence of sample farmers' increased by

1 km leads to a 6% loss of training performance in the sampled FTCs. It is also apparent from the results, farmers' participation in the center activities would increase the performance of training related service of FTCs by 0.244. The positive relationship may increase the awareness and perception of farmers towards FTC services. Therefore, the centers stand to provide training services based on their needs. The same result was indicated by Fisseha, (2009) that lack of community participation is an important constraint for FTC activities.

Variables	Un sta	~	
		Sig.	
	В	Std. Error	
Sex of the Respondents	.037	.030	.225
Age of the Respondents	.003	.002	0.77**
Education level of the	.023	.016	.153
Respondents			
FTCs distance from	060	.013	.000*
Size of land holding	024	021	2/18
Owning livestock	- 016	031	610
Farmers' participation	.198	.040	.000*
Promote new technologies	.072	.026	.007*
Skills and knowledge of DAs	.122	.032	.000*
Poor monitoring and evaluation	077	.026	.003*
Un recommended number DAs	014	.024	.553
Lack of demonstration field	093	.030	.002*
Lack of resource and materials	.020	.029	.488
Linkage with institutions	005	.006	.428
DAs work load	016	.011	.158
(Constant)	.477	.180	.009

Table 5: Regression model on the effects of explanatory variables on the performance of training related services

Note: $R^2 = 0.438$, df= 15, F= 10.075; * &** Significant at 5% and 10% level respectively

Promotion of new technologies at FTCs is an important variable that can affect the training service at 5% significant level; a unit change on promotion of new technologies would increase training related FTCs performance by 0.072 units. This means if FTCs promote new technologies; rural farmers will initiate and participate in the training activities. Skill and knowledge of extension agents was other important variable that can significantly affect the performance of training related activities at 5% significant level. Assuming other variables constant, one unit skills and knowledge of DAs improvement, the performance of training related activities of the centers will increased by 0.122. As Chaudhary and Al-Haj (1985) found in their study a common barrier to effective extension work is the extension worker's lack of competence in such important areas as technical knowledge, farming skills, economic analysis, research procedures and communication abilities. Another study indicated that, DAs lacked necessary practical experience and expertise to teach these skills (Kristin, 2009). Poor monitoring and evaluation is also strongly associated negatively with the performance of training related service of FTCs at 5% significant level. This indicates that since centers training provision were not monitored and evaluated by different responsible stakeholders, the service delivery was reduced. Bernor and Baxter (1984) identified that monitoring and evaluation is not a fault finding mechanism, but rather a positive means to suggest areas requiring attention that may not be readily apparent through the regular in-field review of extension activities. It can create an atmosphere of trust, honesty, and selfcriticism upon which effective extension depends. Ousman, (2007) also indicated that monitoring and evaluation activities of the responsible bodies affected the training related activities. The results also show that lack of demonstration field is negatively affected the training related activities at 5% level of significance. The demonstration fields of FTCs reduced by one unit would reduce the performance of training service delivery by 0.093. Enough demonstration fields are an important instrument in the center to provide practical training to

rural farmers. Fisseha (2009) also identified in his study that lack of demonstration field is one of the major constraints in the FTCs activity. Generally, the performance of training service delivered by sampled FTCs were significantly affected by the above seven important variables identified by the Linear Multiple Regression analysis.

5.3.2 The effect of selected explanatory variables on the performance of Technology transforming activities

Model results also indicate that out of 17 variables assumed that can affect the level of technology transformation activities of FTCs, 6 of them are significant at 5% and 10% level. They are promotion of technologies, FTCs distance, poor training capacity, Unrecommended numbers of DAs, lack of resources and materials and DAs workloads. The R^2 value is 0.45 which indicates that the dependent variable explained 45% by

independent variables. Based on the results, promotion of new improved technology activities significantly affects the technology transform activity of FTCs in the study area at 5% significant level assuming other variables are constant. This means that when FTCs promoted one new improved technologies, the technology test, adapt, and scale-up activities of the centers will increased by 14.3% in the sampled FTCs. The distances of FTCs from the sample farmers' residence is another significant variable that negatively related to the performance of transformation of technology at 5% level. One unit change on the FTCs distance from respondents residence. reduced the performance of technology transform activity of sample FTCs by 0.091 units. This indicates that, one kilo meter increment on the distance of FTCs results 9.1% reduction on the performance of technology testing, adapting and scale-up activities of FTCs.

	Un sta	ndardized			
Variables	Coe	fficients	Sig.		
	В	Std. Error			
Sex of the Respondent	101	.075	.178		
Education level of the Respondents	020	.033	.548		
Family size of Respondent	016	.013	.210		
Provide training service	.102	.168	.544		
Promote new technologies	.163	.068	.018*		
FTCs distance from Respondent residence	091	.034	.007*		
Poor training capacity	060	.034	.085**		
Poor monitoring and evaluation	094	.064	.147		
Low farmers' awareness	029	.063	.644		
Land suitability	.149	.148	.314		
Un recommended numbers of DAs	110	.062	.079**		
Lack of demonstration field	186	.085	.314		
Lack of infrastructure	072	.079	.365		
Lack of resource and materials	238	.076	.002*		
Skills and knowledge of DAs	091	.085	.286		
Poor linkage with institution	.014	.016	.382		
DAs work load	041	.024	.092**		
(Constant)	2.240	.501	.000		

Table 6: The effects of explanatory variables on technology transform activities

Note: $R^2 = 0.45$, df= 17, F= 9.235; * & ** Significant at 5% and 10% level respectively

As indicated in the table 6, the training related activities are the important variable that can significantly affect the performance of technology transformation of the centers at 10% level. If the training related activities reduced by one unit, the technology transformation will reduce by 0.06 units. This indicates that inappropriate training methodology, irrelevance contents of the training, unsuitable period of training and insufficient training duration negatively affects the performance of technology transformation activities in the centers by 6%.

Therefore, FTCs which effectively delivered training service would better perform than others. The model results also revealed that, unrecommended numbers of DAs in the sampled FTCs is a variable which affects the performance of technology transformation activities at 10% significant level. One unit reduction on the number of extension agents in the FTC, reduced the performance of technology transform activities by 0.11 units. That is the number of DAs reduced by one leads to 11% performance loss in the sample FTCs. FTCs have enough

extension agents were well performed than FTCs without expected numbers of DAs in related to technology testing, adapting and scale-up activities. To transform new improved technologies, resource and materials are the important instruments. Table 6 also portrayed that, lack of resource and materials are highly significant at 5% and negatively affect the performance of technology transformation. A unit reduction in resource and materials, leads a reduction of the performance of technology testing, adaptation and scale-up activities by 0.238 units. This shows that, better equipped FTCs were performed well related to technology transformation activities than others. According to the OLS analysis result, workload of DAs significantly related with the performance of technology transform activities negatively at 10% level. This indicates that extension agents carried out non-extension tasks leads to 4.1% performance reduction on technology testing, adapting and scale-up

activities in the sample FTCs.

5.3.3 The effect of explanatory variables on the performance of information related services

The performance of information service delivery by FTCs is also being affected by number of factors. In the model, 13 explanatory variables were entered and 7 of them were statistically significant at 5% and 10% level. The R^2 value of the model is 0.454, which revealed more than 45.5% of variation upon the dependent variable explained by the independent variables. Livestock ownership is one of the variables affects the performance of FTCs information service delivery at 10% significant level. If farmers own livestock more by one unit, the performance of information service delivery of FTCs increase directly by 0.128 units. This means those farmers have more livestock population; the expected FTCs will provide more information services than others.

Variables	Un sta	Sig.	
variables	В	Std. Error	
Sex of the Respondents	.383	.274	.514
Owning Livestock	.128	.073	.084**
Size of land holding	036	.048	.452
FTCs distance from Respondents' residence	.031	.032	.344
Farmers' participation in FTC activities	.153	.086	.079**
Provide Training service	.220	.165	.183
Provide Consultancy service	.419	.067	.000*
Promotion of technologies	.133	.071	.063**
Invitation in meeting, visiting etc	.085	.042	.045*
Participation in community issues	.236	.066	.000*
Lack of resource and materials	048	.063	.447
Level of linkage with institutions	.039	.015	.011*
Poor monitoring and evaluation	042	.062	.504
(Constant)	.383	.274	.164

Note: $\overline{R^2}=0.454$, df= 13, F= 12.515; * & ** Significant at 5% and 10% level respectively

As the result of OLS, participation of respondents in FTC activities and performance of information service delivery positively related and significant at 10% level. A unit increase in participation of farmers' in the planning, implementation, monitoring and evaluation activities of the centers would increase the performance of information service delivery by 0.153 units. Therefore, FTCs have more participants in their activities were well performed than others. Provision of consultancy service is the most important variable positively affects the performance of information related services at 5% significance level. The table (7) result shows, as the consultancy service of FTCs increased by one unit; the information related activities performance will increased by 0.419 units. This indicates that, when FTCs provide consultancy service more and more; the information service delivery performance directly improved in the sampled FTCs by 41.9%. Promotion of new technologies has a positive effect on information service of FTCs and significant at 10% level. If technology promotion level increases by one unit, the level of information service delivery will also increase by 0.133 units. This means, FTCs promote one new technology leads to 13.3% improvement on the performance of information service delivery. Farmers level of invitation by the centers also statistically significant at 5% and positively related with the performance of information service delivery in the sample FTCs. One unit by FTCs in different occasions would increase the performance of centers information service delivery by 0.085 units. This infers that, levels of invitation having a positive effect on information delivery of FTCs. Participation level of farmers in community

issues is yet another important variable significantly affects the performance of information related services of FTCs at 5% level. It has a positive impact on the performance of information service of FTCs and shows that, level of participation of farmers in community issues increased by one leads a 23.9% performance increase related to information service delivery activities. The performance of FTC information service also affects by the level of linkages with different institutions at 5% significant level. That means, the linkage level of FTCs with different governmental and non-governmental institutions has a direct effect with information services of the centers. The above results establish the relation between the performance of information service delivery of sample FTCs and above seven statistically significant variables. Whether the increment or reduction on the variables results either positively or negatively affects the performance of information service delivery of the centers.

5.3.4 The effect of explanatory variables on the performance of consultancy related services

The Multiple Linear Regression results indicate that the performance of consultancy service delivered by FTCs being affected by a numbers of factors. In the model 13 independent variables were entered. As a result, 7 of them were statistically significant at 5% and 10% level. The R^2 value is 0.519 which indicates more than 51.9% of the variation upon depended variable is explained by the independent variables. The analysis result shows that, one unit increment on information service delivery of FTCs creates a 0.392 units direct change on performance of consultancy service in sampled FTCs. This indicates that the information service delivery directly affects the consultancy service delivery. As indicated in the table 8 results, promotion of new technologies have a positive effect on consultancy service of FTCs at 5% significant level. When FTCs promote one unit of new technology, results a 41% increment on the performance of consultancy service delivery of the centers. Provision of other institutional services in the centers also statistically significant to affect the performance of consultancy service delivery at 10% level and one unit change in the service delivery of other institutions would increase the performance by 0.095 units.

Table 8: The Model Output on the effe	cts of explanatory variables on consul	Itancy service
	Un standardized Coefficients	

	Un star		
Variables			Sig.
	В	Std. Error	
Size of land holding	.003	.046	.952
Owning livestock	088	.070	.206
FTCs distance from Respondent residence	.001	.029	.967
Provide information service	.392	.060	.000*
Promote new technologies	.410	.066	.000*
Provide other institutional service	.095	.056	.091**
Farmers' participation in FTC activities	.184	.074	.014*
Poor monitoring and evaluation	.069	.057	.228
Invitation in meeting, visiting etc	.122	.036	.001*
Level of linkage with institution	023	.014	.109
Lack of infrastructure	121	.066	.071**
Skill and knowledge of DAs	099	.070	.160
Work load of Das	057	.020	.005*
(Constant)	348	.260	.183

Note: R²= 0.519, df= 13, F= 16.271; * & ** Significant at 5% and 10% level respectively

Farmers' participation in the centers activities has significantly indicated the performance of consultancy service delivery of the sampled FTCs at 5% level. That is the participation level of respondents increased by one unit; leads to change the level of consultancy services of FTCs by 0.184 units and shows participation has a direct effect on consultancy service of FTCs. Further, the performance of FTCs consultancy service delivery is significantly affected by the level of invitation of sample respondents in different occasions like meeting, visiting etc activities by the centers at 5% level. The invitation level of sample households in different occasion increased by one unit would increased the performance of consultancy service delivery by 0.122 units in the sample FTCs. According to the Model results, lack of infrastructure is another significant variable that affects negatively the performance of FTC consultancy service delivery at 10% level. That is, reduction of infrastructure facilities in one unit would reduce the performance of consultancy service delivery of FTCs by 0.121 units. Thus FTCs which has better infrastructural facilities will perform the consultancy service in a better way than others. Amount and types of work offered to the extension agents is also affects the consultancy service of the centers which significant and negatively affect the performance of consultancy service delivery of FTCs at 5%level. This indicates that the DAs work concentration areas affected the performance of consultancy service of FTCs. Generally, the above seven FTC based extension services significantly affect the performance of FTCs related to consultancy services in the study area. Therefore, the significant variables indicate the performance of consultancy service delivery of sample FTCs.

6. Conclusion and Policy Implications

The poor level of farmers' participation in planning, implementation, monitoring and evaluation activities creates the deficiency of service delivery of FTCs. Even if more sample farmers were trained at least in one type of training in the FTCs, modular, continuous and minimum extension package training types were poorly delivered. In addition, animal husbandry and cooperative related areas of the trainings were given less attention in the sampled FTCs. Mostly FTCs given trainings at peak periods of rural farmers and also the duration of trainings were very boring and not well managed by facilitators. The training methodologies were not carried out as the operational manual of FTC guidance. Most of the sample FTCs follows more theoretical and class lecture methods of trainings. This leads to ineffective training content dissemination to rural farmers. Thus, it can be concluded that the training service delivery are not as effective as required, as far as all the above-mentioned conditions calls for improvement. Even though most of the extension services of FTCs were not effectively delivered, the services provided could contributed to a significance change in technology adoption, application of modern practice and production amount. And also they contributed to change in income and the life condition of rural farmers. This indicates that the FTC based extension services is an important activities to achieve agricultural development and rural transformation.

Generally, FTCs in the study district were not well performed their extension services to achieve agricultural development as the expected performance because of many factors. Based on the findings, the following suggestions are forwarded to improve the performance of FTC based extension services to achieve the expected goals.

• Low participation of rural farmers in planning, implementation, monitoring and evaluation activities in the centers has been observed from the research. Therefore, the centers need to create an opportunity for rural farmers to participate in different activities of the FTCs and also changing the attitude of peoples by educating and motivating them.

- FTCs were established for giving all expected types of trainings to farmers' especially modular type of training. But, results indicate that modular type of trainings was poorly delivered and small number of farmers only graduated by green certificate. Therefore, it is suggested that the responsible bodies including regional agricultural bureau should give more emphasis to modular type of training and provide necessary training materials to deliver training effectively.
- To make the training program more effective and fruitful, the training should be designed according to farmers' needs and interests, by preparing a menu of courses with their duration.
- The training centers should follow the operational manual of FTCs prepared by Ministry of Agriculture in 2009 and the responsible bodies should allocate enough demonstration field and other materials to provide good practical trainings.
- FTCs should give more consideration on testing, adapting different technologies and scale-up to the local conditions.
- DAs need to support farmers' permanently in a planned ways and concerned office should assign recommended number of extension agents in each FTC.
- To make the FTCs more effective, responsible bodies should monitor and evaluate the centers regularly so that communication gap will be solved.

Reference

- Bernor D. and Baxter M, 'Training and Visit Extension; The World Bank, Washington, D.C. 1984.
- 2. Bureau of Agricultural Development (BoAD), Annual Report. Unpublished, Hawassa, Ethiopia, 2012.
- 3. Carvalho J. 'The selection of case file: sampling techniques', The national archives Operational selection policy, p 14, 2005.
- Chaudhary M.A and Al-Haj F.M, 'Agricultural education and extension in developing countries', Agricultural Administration, Vol. 20: pp 169-186, 1985.
- Fisseha Teshome, 'Problems and Prospects of Farmers Training Centers: The case of Ada'a Woreda, East Shewa, Oromia Region', M.Sc. Thesis of Haramaya University., Haramaya, Ethiopia, p 150, 2009.
- Krishi world, 'The Pulse of Indian Agriculture: Agricultural Extension Education, Learning and Teaching in Extension'. 2009. <u>URL:http://www.krishiworld.com/agri/extension/edu</u> <u>i/</u> Retrieved on March, 2013.

- Mesfin Astatkie, 2005. Analysis of factors influencing adoption of Triticale (X-Triticosecale Witmack) and Impact: the case of Farta Woreda. M.Sc Thesis of Haramaya University. Haramaya, Ethiopia.
- Ministry of Agriculture and Rural development (MoARD), 'Farmers training centers: Operational Manual/Guideline/. Addis Ababa, Ethiopia'. Unpublished working paper, 2009.
- Ousman Surur. 2007. Effectiveness of agricultural development training program: The case of Teff and livestock farmers of Halaba Woreda. M.Sc Thesis of

Haramaya University, Haramaya, Ethiopia. p 118.

- 10. Tsegaye Tadesse, 'The Impact of Participatory Demonstration and Training Extension System on Production and Income of The Farmers in Potential Areas of the Amhara Regional State Ethiopia: The Case of Yilmana Densa Woreda', M.Sc. Thesis of Haramaya University. Haramaya, Ethiopia, 2003.
- Wuletaw Mekuria Kebede, 'Effectiveness of Modular Training at Farmers Training Center: The case of fogera district, Amhara National Regional State', M.Sc Thesis of Haramaya University. Haramaya, Ethiopia. p 106, 2010.