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Original Research Article

Farmers' View on Influence of Project Extension Approach on Agricultural Technology Adoption in Elgeyo-Marakwet County

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Abstract: Despite several attempts in dissemination of technologies by various agencies, there has been low adoption rate leading to sustained low production and income to the smallholder farmers. Project extension approach is one such approach that is utilized to disseminate information in Semi-Arid Lands like Elgeyo-Marakwet County in order to enhance the level of adoption of various technologies that could help in enhancing agricultural production. The study was carried out to establish effectiveness of agriculture project extension approach in adoption of technologies among smallholder farmers in Elgeyo-Marakwet County, Kenya. The research adopted a cross-sectional survey targeting 1,025 smallholder farmers. Purposive sampling was carried out on participants in project extension and simple random sampling technique was used to select 278 participants at random based on Krecie and Morgan sample table. Research utilized questionnaire, observation and focus group discussion to get information, which was coded and analyzed descriptively using ratios and percentage, furthermore Pearson correlation coefficient was used to inferentially analyze the findings based on 95% (5% margin of error) significance level. Reliability test of the instrument was carried out based on data from pilot study whose data was used to calculate Cronbach alpha whose results indicated 0.84 which was high enough to allow the utilization of the questionnaire in seeking for data. The results were summarized and presented descriptively through charts, tables and description. The findings established that project extension approach is effective in the dissemination of extension knowledge and in increasing the adoption rate. The findings had statistical significance between views of project extension approach by farmers and the adoption rate ($P<0.05$). Based on the findings extension agencies and policy makers should consider utilizing the project approach in the dissemination of new technologies especially in the ASAL areas.

Keywords: Agriculture Extension, Production, Development, Project.

INTRODUCTION

Background of the study

Global trend indicates technological change is a critical driving force for increased agricultural productivity, production, sustainability as well as income in several countries (Stoian, *et al.*, 2012). Promotion of agricultural technologies is done through extension, which is meant to deliver technology messages from research to the farmer. Among the extension approaches is project extension, which has been utilized in many countries including India, Nigeria and Kenya (Atukunda, *et al.*, 2018). For several years, policies for agriculture, trade, research and development, education, training and advice have played key role in influencing the choice of technology to be disseminated, the level of agricultural production achieved and farm practices to be employed (Baloyi, 2010; Dercon, 2013; Buragohain, *et al.*, 2018). Agriculture in general is becoming more integrated in the entire agro-food chain and the global market operations, while environmental, food safety and quality, and animal welfare regulations are also increasingly impacting on the agriculture sector performance (Chindime, *et al.*, 2016). Agriculture in general is faced with myriad of issues while trying to meet growing need for food, to be internationally competitive and to produce agricultural products of high and accepted quality. Similarly, agriculture production must meet sustainable goals in the context of on-going agricultural international policy reforms as

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it considers trade liberalization and implementation of multilateral environmental agreements that exist within and among the countries (Marco & Yuan, 2012; Atukunda, *et al.*, 2018).

Improved adoption of agricultural technologies increases the potential to enjoy the market share of agricultural products through which the smallholder farmers can maximize their profit (Sseguya, 2009; Wiggins, *et al.*, 2010; Otsuka, 2013; Lowder, *et al.*, 2016). Elgeyo Marakwet project extension approach focused more on the involvement of farmers unlike conventional extension methods where technologies are developed in research stations and passed to the farmers through extension officers (Rigg, *et al.*, 2016). Project extension approach employs full participation of farmers in identification and adoption of technologies, encourages farmers to learn through experience that arise from trials, building on their own knowledge and skills in order to create a blend of new ideas (Onyango, 2014; Donovan, *et al.*, 2015; Rugema, *et al.*, 2018). The purpose of this research was to establish farmers' view on effectiveness of project extension approach on the level of adoption of technologies in Elgeyo Marakwet County.

RESEARCH METHODOLOGY

The research adopted a descriptive survey research design based on cross sectional data collection. The research process utilized both the quantitative and qualitative approaches with aid of structured closed and open-ended questionnaire and interview schedules, which were used to gather information. The questionnaire was calibrated through Cronbach Correlation coefficient from the pilot study that was carried out on 20 respondents whose results was 0.84. Validity was achieved through peer expert analysis. The data were treated based on 95% confidence level. The target population of the research was 1,025 most of who were farmers who participated in the project extension approach in Elgeyo Marakwet County. The research process targeted 1005 farmers and 20 agriculture staff. The research process used purposive sampling technique in targeting the project participants and simple random sampling in achieving the sample size of 282 respondents from the project participants based on Krecie and Morgan sample table.

A fully structured questionnaire was utilized during the study. The questionnaire comprised of open and closed ended questions. The questionnaire was self-administered with the aid of the research assistants that had been trained to guide in the process. All respondents were informed in advance on the purpose of the research and assured of the confidentiality hence all respondents provided the information willingly.

Data from the questionnaire was coded, described and interpreted with aid of SPSS version 22 program which facilitated the analysis of the information. The findings were summarized based on the characteristics of sets of data in terms of ratio and percentage. Furthermore the data was analyzed inferentially using Pearson Correlation Coefficient whose result indicated the significance difference between project extension approach views from farmers and adoption rate ($P<0.05$). The results are presented in form of tables, charts and description of the findings.

RESULTS

A total of 265 questionnaires out of 278 administered were returned. This translates to 95% response rate. 63.4% of the respondents were male an indication that male participated more in the agricultural project activities than female.

Table-1: Response on utilization benefit of the project knowledge in Elgeyo Marakwet

	Embrace new crops		**Improved output**		**Knowledge helped to managed weather**		**Reduced cost of production**		**Timely acquisition of inputs**		**Timely agronomic practices**		**Use of certified planting material**	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Strongly agree	184	69.6	84	31.3	87	32.8	93	35	118	44.1	135	51	153	57.8
Somehow agree	62	23.5	2	0.3	142	53.4	133	50.2	105	39.7	99	37.3	91	34.3
I don't know	10	3.9	77	29	23	8.8	24	8.9	23	8.8	26	9.8	13	4.9
Somehow disagree	2	0.5	93	35	13	5	14	5.4	18	6.9	5	2	4	1.5
Strongly disagree	7	2.5	9	3.4	0	0	1	0.5	1	0.5	0	0	4	1.5
Total	**265**	**100**	**265**	**100**	**265**	**100**	**265**	**100**	**265**	**100**	**265**	**100**	**265**	**100**

Most participants of the research process indicated strong agreements towards the project having led to the adoption of growing new crops in the area with a response rate of 69.6%. This was followed by those who somehow agreed (23.5%), those who didn't agree (3.9%) Strongly disagreed (2.5%) and somehow agree (0.5%) as indicated in the Table-1.

Research sought to find out the level of agreement on project improvement of agricultural production output. The findings indicated high percent (35%) disagreed somehow while 31.3% strongly agreed. However 29% were undecided on the level of agreement. A total of 3.4% disagreed strongly on the level of production due to project and those who somehow agreed were 0.3% of the response rate as shown in Table -1.

The findings of the study sought to find out the influence of the project knowledge on weather mitigation and the results showed that 53.4% of the response rate somehow agreed, 32.8% strongly agreed, 8.8% were undecided while 5% somehow disagreed.

The research findings indicated that 50.2% of the response rate somehow agreed that knowledge acquired from the project helped in the reduction of production cost and 35% were of higher opinion and hence strongly agreed that the trainings influenced reduction of production cost. The study sought to find out whether the project knowledge had influenced the timeliness of farm inputs acquisition and the findings indicated strong agreement and somehow agreement at 44.1% and 39.7% respectively. A total of 8.8% of the respondents didn't know the extend of influence while 6.9% somehow disagreed and 0.5% totally disagreed.

On timely agronomic practices implementation, 51% of the respondents strongly agreed that the project knowledge had influenced the practices while 37.3% somehow agreed on the influence of project knowledge on the agronomic practices. A total of 9.8% of the response rate were non-committal on the extend of influence of project knowledge on agronomic practices. However 2% of the respondents somehow disagreed. The use of certified planting material was influenced by the project knowledge with 57.8% of the response rate confirming the same. Furthermore 34.3% somehow agreed that the project knowledge had an influence on acquisition of certified planting material by the farmers. The research further established that 4.9% didn't know whether the project knowledge was influential to the use of certified planting material. A total of 1.5% of the response rate represented strongly disagreed and somehow disagreed at an equal level as shown on Table -1.

Table 2: Adoption Knowledge Level on various technology aspects

	Use of certified planting material		**Proper use of chemical**		**Improved pasture integration**		**Increased leadership skills**		**Timely agronomic practices**		**Timely Acquisition of inputs**		**Quality of animal breeds**	
Level of adoption	N	%	N	%	N	%	N	%	N	%	N	%	N	%
None	8	3	4	1.5	10	3.9	8	3	5	2	4	1.4	17	6.4
Low	12	4.4	29	10.8	56	21.2	51	19.2	22	8.4	32	11.9	70	26.6
Moderate	46	17.2	119	45.2	83	31.5	102	38.4	121	45.3	116	43.6	61	23.2
High	137	51.8	76	28.7	77	28.6	76	28.6	83	31.5	80	30.2	67	25.1
Very high	62	23.6	37	13.8	39	14.8	28	10.8	34	12.8	33	12.9	50	18.7
Total	265	100	265	100	265	100	265	100	265	100	265	100	265	100

Table -2 shows that 92.5% of the response rate had increased knowledge of certified planting material due to project knowledge while 7.4% indicated low knowledge about certified planting material. This is satisfactory enough to confirm that the project extension approach had positive influence on transfer of knowledge and in changing attitude of farmers. Participants in the research indicated that knowledge acquired in the project helped in implementing proper chemical use as confirmed by 87.7% of the response rate. On the other hand 12.3% of the respondents were of the descending opinion about the influence of project knowledge on proper chemical use. Findings shows that 74.9% of the response rate had increased knowledge on improved pasture integration due to the knowledge acquired on the project trainings while 25.1% had low knowledge on improved pasture integration. This indicates that majority of the respondents benefitted from the project extension approach. On improved leadership skills, the research shows that 77.8% of the respondents indicated that there was increased knowledge on leadership skills while 22.2% of the respondents indicated low knowledge on leadership skills.

Table -2 shows that 89.6% of the response rate was of the opinion that there was improved timely agronomic practices due to project trainings while 10.4% of the response rate were of the descending opinion. This indicates that the project approach had a positive influence on improved timely agronomic practices. As indicated by 86.7% of the response rate, there is an increased knowledge on timely acquisition of farm inputs due to project trainings while 13.3% indicated low knowledge about timely acquisition of farm inputs. This confirms that the project influenced positively timely acquisition of farm inputs of farmers in the area. The research findings indicated that 67% of the response rate agreed that the knowledge acquired from the project helped in selection of quality animal breeds while 33% of the response rate indicated low knowledge on selection of quality animal breeds.

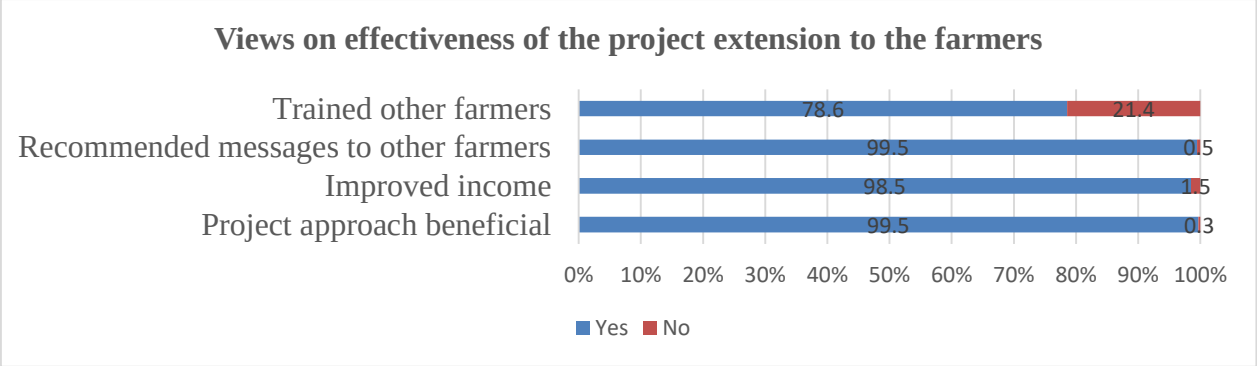

Fig.-1: Views on effectiveness of the project extension to the farmers

Figure-1 shows that 78.6% of the response rate had disseminated the knowledge acquired from the project to other farmers while 21.4% of the respondents didn't train other farmers. This is an indication that the respondents were willing to share the knowledge acquired from the project to other farmers. The research findings indicated that 99.5% of the respondents agreed that the project approach was beneficial. Only 0.5% of the response rate felt the project approach was not beneficial. This indicates that the project approach had a positive influence. Findings in Figure 1 shows that 98.5% of the respondents were of the opinion that there was improved income as a result of knowledge acquired on project trainings. Only 1.5% of the respondents were of the descending opinion. Many respondents are willing to recommend the project extension approach to other farmers an indication of better project reception in the area. 99.5% of the respondents indicated the willingness with only 0.5% objecting the beneficiary

DISCUSSION

The Kenyan agricultural sector, which directly contribute 28% to the GDP, and provide formal and informal employment in the rural areas, has been facing diverse challenges making it weak and uncompetitive. The challenges include non-adoption of improved technologies, weak linkages and interaction between stakeholders, poor infrastructure and unfair competition from open market operations, among others (Rigg, et al., 2018). These have ranged from linear technology transfer, farming systems to farmer participatory methodologies. Agricultural technologies have the power to drive economic development and improve food and nutritional security around the globe (Sakiluzzaman et. al., 2018). According to Ferguson (2015), global food production will have to increase up to 80 percent by 2050 in order to meet the growing demand. The research established that the technologies, which showed high adoption, were; use of certified seedlings and proper use of chemicals. The respondents were in agreement that the project extension approach played a great role in the adoption of the technologies this is because the farmers were fully involved in the selection of the technologies (Larsson, 2013).

The findings of the study established the community felt that extension messages caused significant level of adoption of new technologies, which create the increase in output of production and hence translated to income level increase in the smallholder farming community and the country at large. Extension disseminate technologies from research to farmers, this is because gaps in information normally contribute to reduced yield and income. As farmers embark on an enterprise they require information on the tools of practice, market and pricing dynamics as well as how to achieve information packages. The research further established willingness of the community to participate in the project extension approach, which they feel is one of the effective ways of dispensing and diffusing technologies in the community. The results of the study showed an indication that the project extension in the area had a positive outcome by increasing the output production since many of the response strongly agree that the project had increased the output level. Extension messages influences the farmers to change the way they operate and hence enhance the level of activity schedules and technology implementation. The messages of extension helps the farmers to keep and track records about the weather hence can predict the challenges that may arise due to weather. Furthermore extension messages to the farmers through project methods help the farmers to reduce the cost of production due to the timeliness of purchase and utilization of outputs. This is why the farmers agree that the technology information acquired during the training in the extension programs are good and enhance income by reduced cost of production.

Research findings established that the extension programs always helps the farmers to identify the types of inputs and the times of acquisition a situation which helps the farmers to properly use the resources and for the crops to utilize the nutrients well without leaching or through any other waste means. Besides the timely acquisition of inputs farmers also get knowledge of how to effectively manage the agronomic and livestock practices within the farms hence reduce the competition of the crops with weeds as it enhances the utility of nutrients and efficacy of the agrochemicals. Research further established that

extension especially the project approach enhance the use of certified planting material away from the traditional planting material which produce less. Certified planting materials have a tendency of giving high output, which is translated to increased income to the farmer. Like other approaches in extension, the research findings showed that farmers could benefit in achieving high income through the types of the certified planting material that are available for choice. This could be described to mean that the research institutions need to carry out demonstrations or offer free sample seeds for the farmers to learn about the new releases of the planting materials. This is satisfactory enough to confirm that the project extension approach have positive influence on transfer of knowledge and in changing attitude of farmers. Besides the planting materials accessed by the farmers, the findings further established that increased knowledge in the proper use of the chemicals which has a capacity of reduced the productivity and production of the enterprise hence increased income to the farmer eventually.

Elgeyo Marakwet County is both agricultural and livestock production area and research established that extension messages influenced positively on the pasture integration by the farmers leading to the availability of the animal feed hence increased production and income from sales of the animal produce and products. Due to increased knowledge in the farming activities and animal management the research findings indicated that those who participate in the extension activities and in the knowledge acquisition have increased leadership skills in their families and farmer groups. This should encourage the extension practitioners that the messages helped the farmers build their leadership skills and entrepreneurial capacity hence increased house hold income to the rural folk. The skills and knowledge helps the livestock farmers to procure quality feeds in a timely manner thus enhance animal production and income to the household and community at large. Correlation coefficient established statistical significant relationship between the participation in the project extension approach with $P<0.05$. The relationship was due to the acquisition of knowledge and skills that could enhance the productivity, production and income to the farmers. Farmers therefore are highly encouraged to participate in the projects that are meant to propagate new technologies in the area for them to acquire current skills towards agricultural production.

Many respondents agreed that they participated and hence dispensed information to other farmers who did not attend the project extension a situation which concurs with observation by Chindime et.al., (2016) who found out that project participation enhances participants the ability to influence and share knowledge with others in the community. To some extend the leadership of the caucus groups may influence the participation or no participation in the technology transfer through the project approach. Selective handling of the participants influence the confidence level of the participants hence the choice of whether to adopt the fronted technology or not as informed by Baloyi (2010) and Narayana,et al., (2014). Participants in project extension approach were of the tendency to disseminate the acquired knowledge and skills to other farmers who may not have participated in the same as established by the findings of the Pearson correlation, which showed statistical significance ($P<0.05$)

Agricultural Extension facilitates the community to acquire skills and knowledge that help in the improvement of production and productivity of the agricultural enterprises and hence improve the rural development rate. Agriculture extension also assists the leader in the implementation of the national policies, strategies and activities that are meant to build the economy of the country towards its potential. Extension further enhances the communication of the objectives of the government and individual organizations towards the global goal alignment. Research findings established that the initial and much felt importance of the extension service in the dispensation of knowledge was in the income level which always increased to the extent that its multiplier effect is the social factors like being able to build good houses, pay bills well and confidently. Due to its importance most research established willingness of the beneficiaries of the technology adoption to share information with those who did not get the information during the project time. This is a situation, which is crucial and important in the diffusion of the knowledge in the community. Social economic factors had statistical significance on the adoption of new technologies in the area as found out by the findings of the study ($P<0.05$).

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