

## A Comparative Study on the Effectiveness of Radio and Television Programs in Dissemination of Recommended Agricultural Technologies in Kassala State, Sudan

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**Abstract:** This study was carried out to investigate the effectiveness of radio and television in the dissemination of recommended agricultural technologies in Kassala locality of Kassala State, Sudan. The simple random sample was adopted to select 160 farmers from the population in the study area. The primary data was collected using a structured questionnaire. Descriptive analysis used to display the socio-economic characteristics of respondents and T-test analysis used to test the strength of relationships between some variables. The findings of T-test analysis revealed no difference between the radio and television programs in terms of their effectiveness in changing the farmers' knowledge. The findings also indicated a significant difference between the effectiveness of the radio and television channels to influence farmers' attitudes and behavior toward the seven types of agricultural technologies (land preparation, sowing method, fertilizer use, control of pests and diseases, harvest, post-harvest, and problems solving), indicating that the TV is more effective than the radio in influencing farmers' attitudes to adopt the recommended agricultural technologies. The study recommended some interventions to effect radio and TV agricultural programs to disseminate the recommended agricultural technologies among the farmers.

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### 1. Introduction

The main problem facing the developing world today is not only lack of technologies and scientific discoveries needed for economic growth and rural development but their conversion into production accomplishments and using them as an instrument of economic growth and social change. However, this will depend largely on the speed with which the technology is transferred from its source (agricultural research institutes, universities and so on) to the ultimate unit of its utilization so that the users clearly understand, accept and apply it in their day to day practices. This, in turn, demands a suitable and effective communication strategy (Olaleye et al., 2009). This low yield may be attributed to non-adoption of the latest agricultural technologies and poor farm management by the farmers, to improve productivity; the smallholders need access to improved technologies, best practices, and to appropriate, timely and comprehensive information and knowledge on production (Munyua et al., 2008). Therefore, agricultural education, information and skill development are the main concerns of agricultural extension agencies. As far as the education of the farmers is concerned, it focuses on

giving them latest knowledge of agriculture, equipping them with necessary skills and developing their attitude toward modern agriculture (Farooq et al., 2007).

The adoption of new varieties by region, painting a picture of low adoption in developing countries, especially those in sub-Saharan Africa, this complexities of the agricultural production function imply that farmers need information on a variety of topics, at a variety of stages (AKER, 2010). The farmer needs information on production technology that involves cultivating, fertilizing, pest control, weeding, and harvesting. This sort of information is at the moment being diffused by extension workers, other farmers, government parastatals and agricultural equipment dealers (Ozowa, 1997). Agricultural extension has been put forth as a means of reducing the information asymmetries related to agricultural technology adoption in both developed and developing countries, for effective delivery of extension message to farmers, among other things, the extension staffs need to be kept up to date, in terms of the frequently changing knowledge and practices related to farm or cattle management in developing countries (Dulle, 2000). According to Hoi (2007),

agricultural extension is an unofficial education process for farmers, this process provides farmers with information and advice which help them to solve problems or difficulties facing in their life. Extension in general aimed at changing farmers' behavior (knowledge, attitudes, and practices) and it plays an important role in national development, particularly in agricultural and rural development to enhance their ability to deal with their problems and meet new

opportunities (Encanto, 2002). In addition, the agricultural extension transmits farmers' problems to research organizations to find appropriate scientific solutions (feedback) and this requires close contact and full cooperation between agricultural research and agricultural extension. This importance of cooperation between the farmers, extension and research linkage clearly illustrated as shown in the figure 1.

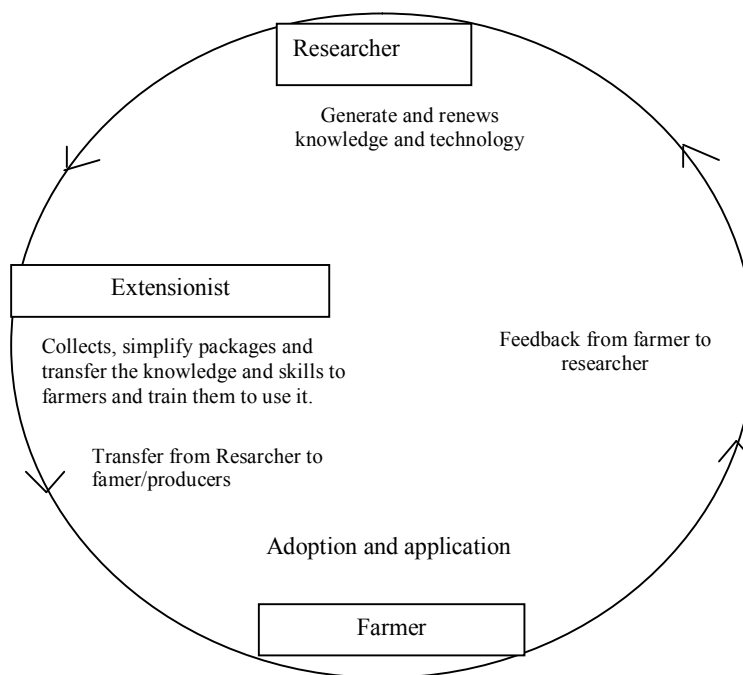


Figure 1: Farmers, extension and research linkage  
Source: (Yahia, 2014).

The agricultural extension uses many types of methods, these methods are classified into three types, which are: Individual, group, and mass-media methods (Yahia et al, 2017), to transforming the agricultural sector from a traditional to a modern system by expanding and enhancing the farmers' knowledge, attitudes, and skills. It also helps in solving the agricultural problems by drawing the attention of researchers and decision-makers to deal with these issues (Eltayb, 2010). Although to this great role of agricultural extension, but agricultural extension systems in developing countries and in Africa in particular, have been criticized for their ineffectiveness. Insufficient manpower, financial constraints, lack of routine upgrading of agents' agricultural knowledge, the haphazard nature of agents' contact with farmers, the dissemination of highly technical packages to barely literate farmers, services' reliance on large staffs of paraprofessionals (whose morale is said to be undermined by poor and

irregular pay and inadequate supervision) are among the most cited problems hindering the effectiveness of extension services in developing countries (Obidike, 2011). Extension services face obstacles, including limited staff who must reach large numbers of geographically dispersed farmers. Agent-to-farmer ratios are extremely high, for example: as high as 1:6,000 and the majority of small, marginal farmers worldwide receive only one-third of all extension resources. For the small fraction of rural farmers who are reached, are often inadequate for many reasons, including under skilled agents with limited accountability and the inability of illiterate farmers to take notes (Schmidt et al., 2012). The general lack of awareness among small-scale farmers can be attributed to their high level of illiteracy. This contributes to the low level of adoption of agricultural production technology (Ozowa, 1997). According to Yahia (2014) in Sudan, the difficulty of delivering agricultural information to farmers by direct contact

methods (individual and groups methods) is caused by the large number of farmers spread out over large agricultural areas (in scattered villages), which are covered only by a small number of extension workers with very poor means of transportation and few roads to link the villages with the agricultural extension services' centers, so the average range of extension supervision in Sudan ranges between 1:1083- 1:5360 in a study conducted in six states compared to the scope of extension supervision for agricultural work set by the FAO, which is 1:500, hence the use of mass communication, are very useful to provide agricultural information to farmers at the same point of time. Moreover, as indicated by Saleh (1997) the mass media methods in agricultural extension work include the following media: agricultural journalism, extension publications (leaflets, bulletin, pamphlet, news réel, circular letters), extension posters, radio extension programs, television extension programs, agricultural exhibits, museums, agricultural electronic websites in international information network (Internet), and recordings. Radio set has certain advantages in localizing the rural development effort. It is a relatively inexpensive medium compared with television, and the effectiveness of radio for educational purposes has not been as widely tested as television. Still, there is considerable evidence that radio can be and has been used effectively for instruction in formal school settings, out of school teaching and community development (Khan and Shabbir, 2000). Radio sets are convenient: they are portable and farmers can take these with them to the field or to the market (Encanto, 2002). Radio is a tool for the delivery of quick information (IRFAN et al, 2006; Butt et al., 2008). Less cost: Studies in Vietnam have shown that messages such as avoiding insecticide or rice for 40 days to conserve natural enemies, can be transmitted by radio in few minutes, but whatever radio's limitations, it may cost 1000 times less than face-to-face extension, per person reached (Chauhan., 2007). Community Radio Stations is an important mechanism for disseminating knowledge and information in different languages and formats especially to poor people. Findings of some studies indicate that radio is the most highly used media in accessing development and agricultural information. Following the liberalization of airwaves in most African countries, there has been a mushrooming of radio stations, many of which facilitate agricultural marketing and dissemination of market information (Munyua et al., 2008). They further maintain that in an era of rapidly developing information and communication technologies, rural radio is a powerful mechanism for linking old and new technologies, providing information resources cheaply to those who need to improve their

livelihoods, while at the same time strengthening existing resource of knowledge, enterprise and cultural identity (Mokotjo and Kalusopa, 2010). Radio is more suitable technology for poor and illiterate people because radio is the cheapest electronic communication technology, receivers cost perhaps \$ 1 to 2 plus the cost of batteries (or a wind-up model, which does not need batteries, can be purchased for \$ 10 to \$ 25). They do not require an electrical connection and (unlike fixed-line telephony or the Internet, for example) they are standalone appliances. This help to explain why 40% of rural households in the low-income countries of sub-Saharan Africa and Asia already own a radio. On transmission side programming and broadcasting is also relatively inexpensive. The radio programming is cheap enough to be produced locally and in a range of language, for example in Latin America most radio (as opposed to television and Internet) is produced locally or nationally (Kenny, 2002). further maintains that radio is favoured as a medium of communication in rural communities because of the advantage of demanding less intellectual effort than the print media messages and also because it is able to reach remote areas, even where there are no extension agents, as long as there is a good reception (Mokotjo and Kalusopa, 2010). According to Chauhan (2007) special features of radio, are: cheap, portable, provides information entertainment and education, can quickly transmit messages in most remote areas, distance learning is possible through radio, cheap helpful in forming public opinion, radio can listen even while the listener engaged in other activities.

Despite the many advantages of radio, but it has some disadvantages: Radio: Reaches many people with the speediness of message, but Easy to miss information (TURRELL et al., 2002). Radio's lack of visual information limits its ability to show a new tool or detailed symptoms of plant diseases. However, topics like planting date, where to get clean seed or the virtues of crop rotation can be discussed verbally, without a picture (Bentley et al., 2007). Some limitations of radio for educational purposes are that it inherently lacks interaction; instructor feedback and clarification are generally unavailable; instruction cannot be interrupted or reviewed by students (unless it is tape-recorded); the pace of the lesson is fixed; note-taking is difficult for some, and time for reflection is minimal. To overcome these drawbacks, preparation, supporting materials, and follow-up exercises are recommended when possible (Chandra and Sharma, 2003). The main disadvantage of the radio set is the lack of visual presentation; usually, expert scientists or extension personnel explain research outputs in a lecture format or in an interview with a professional broadcaster. Audiences are more

likely to learn and be interested in the interview than the lecture. More imaginative formats and strategies for radio use can create opportunities for feedback and dialogue, local adaptation of content through local and vernacular radio, and farmer-to-farmer extension. On the hand, television is a powerful medium of information exchange in these days (IRFAN et al., 2006). Television plays an important role in sharing the attitude, creating interests, presenting factual information and demonstrated and offering opportunities for new wonderful learning experiences (Butt et al., 2008). Television is used to reach large numbers of people quickly and serves an important and valuable function in stimulating farmers' interest in new ideas (Mokotjo and Kalusopa, 2010). Television an audio-visual medium, TV, has been more advantageous than any other medium (Chauhan, 2007). However, television is the least appropriate technologies to access agricultural information in developing countries, due to poor TV coverage; only farmers in the lowlands can have access to the TV. One other reason is that TV sets are very expensive to most of the rural farmers and also use electricity which most of them do not have in their homes, furthermore, to some of the farmers, television is not seen as a source for obtaining information, but rather as entertainment media (Mokotjo and Kalusopa, 2010). The use of radio and TV agricultural program are very important to deliver agricultural information to farmers, and to solve the problem facing agricultural extension, which includes, according to the field visits observations, the open question and discussions with the Directors of the Technology Transfer and Extension in the state, the following problems are delineated: Shortage of trained and qualified extension personnel to cover all areas with the extension service, lack of the necessary and needed finance in the needed time to implement the planned programs, and lack of extension means and equipment needed for the efficient execution including cameras, bicycles and cars (Administrative of Technology Transfer and Extension, 2017). (Technology Transfer and Extension Administration, 2017).

Kassala State Radio Station was established in 1987 as a medium wave (251m) with 5 kilowatts strength. In 1999, a transmission unit was added (FM Earth) operated through Arabsat (Satellite, to cover all Eastern States of Sudan (Kassala, Gadarif, Red Sea and parts of the Blue Nile, River Nile and the Khartoum States. The Unit also covered Al Gash and Baraka Regions in Eretria State. Today, Kassala State Radio Station transmits three main agricultural programs, namely; Ard Al Khir, Ogash, and Kapsulat Zirraeia (The General Corporation for radio and TV of Kassala State, 2018). The Kassala Stae Television

Station was established in 2011 with a very limited coverage area. It is connected with the Arabsat since 2011 and broadcasts for 24 hours, meanwhile, Station transmits only one agricultural program called Arduna-Al Tayiaba (The General Corporation for radio and TV of Kassala State, 2018).

## 2. Objectives of the Study

The main objectives of this study is to determine the effectiveness of radio and television in the dissemination of recommended agricultural technologies in Kassala locality, Sudan. The f specific objectives were to:

1. Identify the socio-economic characteristics of the respondents.
2. Determine the level of follow-up of respondents to agricultural programs in radio and television.
3. Investigate the effectiveness radio and television programs on the respondents' attitudes toward the recommended agricultural innovations.
4. Identify the radio and television programs influence on respondents' adoption behavior of the agricultural innovations in the stud area.

## 2. Methodology

### Area of the Study

Kassala State is located in the North-Eastern part of Sudan. The total population of the State 1,527,214 inhabitants. Administratively it is divid to 13 localities; namely Kassala, Atbara River, Talkuk, Rural Aruma, Hameshkoreb, Rural Khashm Al Gerba, Rural Kassala, Halfa Al Jadida, Rural West Kassala, Wad Elhillew, and North Delta (GAI, 2014). Kassala is characterized by diversity of agricultural systems, resulted in a multiplicity and diversity of crop production. The temperature average between is 32-47°. Average rainfall range between 100-150mm. Crops composition include rain fed: Sorghum, Sesame, Groundnut and sun flower, and irrigated sorghum, watermelons, fruits, vegetable, cotton, wheat, and groundnut, (Agricultural Planning Administration and Training Administration (2018).

### Data collection and Analysis

The study was conducted in Kassala locality of Kassala State. The Simple random sample was adopted to select 160 farmers from five villages purposively selected (30 respondents from each). The Statistical Package for the Social Sciences (SPSS) used to analyze the obtained data by for descriptive analysis carried out to display frequencies and percentages of data with one variable. T-test analysis used to test the strength of relationships between some variables.

### 3. Results and Discussion:

Data in table 1 show that 97.5 of the respondents are economically active and in age group 20-60 years old. The table also illustrates that 80.6% of the respondents are educated at different levels as 24.4%, 26.9 and 11.3% as primary, secondary education and university level respectively. High percentage of education among the respondents is a positive indicator, because the educated farmers are expected to adopt new agricultural technologies more than others do. They also could assist to transfer the new knowledge and skills to other farmers, which facilitates the diffusion and adoption of new agricultural innovations. In this regards Yahia, (2014) commented that education increases the awareness of individuals and helps to adopt the new ideas. Regarding farms ownership, results in the table revealed that 63.8%, 26.2% and 10% of respondents are farms owners, land rental, and sharecroppers respectively. The high percentage of farm private ownership indicates a greater possibility of technology adoption the study area.

Table 2 indicates that 69.4% of respondents own radio sets is a positive indicator, because the ownership of a radio set is a tool of change and transformation. About 72.5% of respondents own TV

set (s). This also is a positive indicator, because the majority of farmers enjoy watching *inter alia* specialized agricultural TV programs. Information from radio and TV programs usually develop the farmers' ideas and attitudes. Therefore positively influence their daily life and farm practices (Yahia, et al., 2017).

Table 3 shows that 67% of respondents followed the agricultural radio programs on three different frequency levels as 17.8% 35.5% and 46.7% rarely, sometimes and continuously respectively. Those who followed the programs rarely and/or sometimes commented that the program casting time is inconvenient for them. The table also indicates that 53.1% of respondents watched the agricultural TV programs on three frequency levels: rarely (10.6%), sometimes (34%), and continuously (57.4%). Respondents who watch the TV agricultural programs either rarely or sometimes concluded that they have no time to watch continuously. About 62.3 % and 52.1 of respondents who did not follow the radio and/or TV agricultural programs (respectively) indicated that they do not know the programs. However, 28.3% and 25% (the radio and TV respectively) commented that the broadcast time is inconvenient.

Table 1: Demographic Characteristics of Respondents

Variables	F	%	Variables	F	%
Age			Education		
20- 29	24	15	Illiterate	31	19.4
30-50	96	60	Primary	68	24.4
51-60	36	22.5	Secondary	43	26.9
60+	4	2.5	University	18	11.3
Total	160		Total	160	100
Farm Ownership					
Own		102			63.8
Rental		42			26.2
Shared		16			10
Total		160			100

Table 2: Respondents' Ownership of Radio and TV Sets

The Issue	Radio		Television	
	Frequency	Percent	Frequency	Percent
Ownership of Radio or TV				
Yes	111	69.4	116	72.5
No	49	30.6	44	27.5
Total	160	100	160	100

Results in table 4 revealed that radio and TV programs are relatively the same in terms of their effectiveness in changing the farmers' knowledge and providing them with new information about the recommended technologies (land preparation, seed varieties, sowing method, irrigation methods, fertilizer

use, weeding, control of pests and diseases, harvest, post-harvest, and problems solving). The results indicate that there is no difference between the two means of communication (radio and TV) in raising awareness about these technologies among respondents, despite the TV have more educational

features for the farmers than the radio. This finding is in line with Rogers (2003), who commented that the mass media channels, which include the radio, TV and newspapers, among others, usually represent the most rapid and efficient means of informing an audience of potential adopters about the existence of an innovation - that is, to create awareness as well as knowledge about the particular advancement (this means that there are no considerable differences between the radio and TV in delivering theoretical information about new innovations).

Data in the table also show significant difference between the effectiveness of agricultural radio and TV programs in providing information about marketing technology, which actually indicates that the radio is better than the TV in providing agricultural marketing information.

That is may be attributed to the daily short information pieces (agricultural information capsules) broadcasted via radio stations in other states to deliver small pieces of information to assist farmers in some daily activities such as marketing issues.

Table 3: Respondents Follow-up to Radio and Television Agricultural Programs

Classification	Radio		Television	
	F	%	F	%
<b>The follow-up</b>				
Yes	107	66.9	<b>85</b>	<b>53.1</b>
No	53	33.1	<b>75</b>	<b>46.9</b>
Total	160	100	160	100
<b>Level of follow-up</b>				
Rarely	19	17.8	<b>9</b>	10.6
Sometimes	38	35.5	<b>28</b>	34
Continuously	50	46.7	<b>48</b>	57.4
Total	107	100	<b>85</b>	100
<b>Reasons of not following the programs</b>				
Don't have radio/TV	5	9.4	<b>17</b>	22.9
Don't know programs	33	62.3	<b>39</b>	52.1
Broadcast time is not appropriate	15	28.3	<b>19</b>	25
Total	53	100	<b>75</b>	100

Table 4: Comparison between Radio and TV in Affecting Respondents' Awareness and Knowledge

Agricultural technology	The mean		T-test for equality of mean		Sig. test of mean channels
	Radio	TV	t	Sig. (2-tailed)	
Land preparation	1.80	1.73	1.524	0.128	Relatively same
Seed varieties	1.85	1.85	0.268	0.789	Relatively same
Sowing method	1.61	1.61	-0.096	0.924	Relatively same
Irrigation methods	1.89	1.90	-0.285	0.776	Relatively same
Fertilizer use	1.70	1.68	0.354	0.723	Relatively same
Weeding	1.87	1.92	-1.134	0.258	Relatively same
Pests and diseases Control	1.96	1.97	-0.150	0.881	Relatively same
Harvest	1.93	1.91	0.522	0.602	Relatively same
Post-harvest	1.95	1.97	-0.600	0.550	Relatively same
Marketing	1.97	1.55	5.917	0.000	Significantly different
Problem solving	1.97	1.99	-0.927	0.355	Relatively same

Data in table 5 shows significant difference between the effectiveness of the radio and TV programs in influencing farmers' attitudes toward the seven types agricultural technologies (land preparation, sowing method, fertilizer use, control of pests and diseases, harvest, post-harvest, and problems solving) introduced in the study area. This result indicates that the TV program is more effective than the radio in changing farmers' attitudes toward

these technologies. The table also shows both that the communication channels (radio and TV) are relatively the same in changing farmers' attitudes towards regarding four types of agricultural technologies (seed varieties, irrigation methods, weeding, and marketing).

Results in table 6 revealed significant differences between the effectiveness of the radio and TV in changing farmers' practices to adopt seven types of

agricultural technologies. These technologies are; land preparation, sowing method, fertilizer use, control of pests and diseases, harvest, post-harvest, and problems solving). The data also indicate that the TV is better than the radio at showing the different stages of these technologies to farmers, made them able to practice, and apply the new technologies in their farms. This result is in line with Yahia (2014) who stated that the TV is more influential communication

channel of mass, because it utilizes the sense of hearing and seeing (making it more similar to interpersonal communication). Therefore, it could effectively be used as a mean of introducing and demonstrating new information. Hence, the TV have a greater effect than the radio on farmers' behavior in the two stages of decision and implementation processes technology adoption.

Table 5: Summary of the Differences between the Radio and TV to Change Respondents' Attitudes toward Agricultural Innovations

Agricultural technologies	The mean		T-test for equality of mean		Sig. test of mean channels
	Radio	TV	t	Sig. (2-tailed)	
Land preparation	1.52	2.95	-30.887	0.000	Significantly different
Seed varieties	2.51	2.56	-0.873	0.383	Relatively same
Sowing method	1.50	2.80	-24.131	0.000	Significantly different
Irrigation methods	2.06	2.23	-1.493	0.137	Relatively same
Fertilizer use	1.48	2.69	-23.325	0.000	Significantly different
Weeding	1.96	1.92	-0.304	0.762	Relatively same
Pests and diseases control	1.23	2.69	-34.231	0.000	Significantly different
Harvest	1.29	2.91	-18.061	0.000	Significantly different
Post-harvest	2.45	2.83	-2.986	0.004	Significantly different
Marketing	2.36	2.19	1.183	0.239	Relatively same
Problem solving	1.56	2.90	-17.884	0.000	Significantly different

Table 6: Differences between Radio and TV Programs in Raising Respondents' Awareness and Technology Adoption

Technology	The mean		T-test for equality of mean		Sig. test of mean channels
	Radio	TV	t	Sig. (2-tailed)	
Land preparation	2.50	2.96	-8.770	0.000	Significantly different
Seed varieties	2.47	2.51	-0.706	0.481	Relatively same
Sowing method	1.92	2.68	-9.920	0.000	Significantly different
Irrigation methods	2.12	2.08	0.291	0.771	Relatively same
Fertilizer use	1.97	2.62	-11.158	0.000	Significantly different
Weeding	1.89	1.90	-0.058	0.954	Relatively same
Control of pests and diseases	1.78	2.73	-18.187	0.000	Significantly different
Harvest	1.36	2.95	-17.072	0.000	Significantly different
Post-harvest	1.82	2.11	-1.933	0.054	Significantly different
Marketing	1.98	1.81	1.023	0.309	Relatively same
Problem solving	1.90	2.41	-5.691	0.000	Significantly different

### Conclusion and Recommendations:

In conclusion, both radio and television programs are effective in influencing farmers' decision to adopt the recommended agricultural technologies in the study area. The study findings revealed that the TV programs are more effective to influence farmers' attitudes towards the new agricultural technologies and to promote their adoption decision. The study recommended encouraging farmers to own TV sets to have access to information on new agricultural technology necessary to their farm development. The General Corporation for Radio and Television of the State need to review

the time of broadcasting agricultural radio and TV programs to suit farmers' convenient time.

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**References:**

1. Agricultural Planning Administration, Ministry of Agriculture, Kassala state (2017). Annual Report: 59.
2. AKER, J. C. (2010) Dial “A” for Agriculture: Using Information and Communication Technologies for Agricultural Extension in Developing Countries, MSc. Thesis, Tufts University, Economics department and Fletcher School, Medford: 39.
3. Alsadding, A. N. (2010) evaluation of agricultural extension services in some states in Sudan through the period: 1958-2008, university of Khartoum (PhD thesis): 321.
4. Amir, S. M. (2018) socio-economic impacts of microfinance on rural women in shikan locality, north Kordofan state, Sudan, (M.Sc. thesis) University of Khartoum, Faculty of Agriculture, Department of agricultural Extension and Rural Development: 52.
5. Elhassan, A. A., Sadding, Kh. R., Oshiekh, M. A., (2011) agricultural extension guide: administrative of Technology Transfer and Extension, Kassala state: 120.
6. Eltaib, A. Y. (2010). Challenges Facing the Adoption of Agricultural Technologies in the Rain-fed Area of White Nile State, Sudan, (Ph.D. thesis), University of Khartoum, Faculty of Agriculture, Department of agricultural Extension and Rural Development: 112.
7. General Administration Investment (GAI), Ministry of Finance, Economy and Manpower (2014), State agricultural investment map, Kassala State: 65.
8. Mokotjo, W. & Kalusopa, T. (2010) *Evaluation of the Agricultural Information Service (AIS) in Lesotho*, International Journal of Information Management, doi:10.1016/j.ijinfomgt.:1-7.
9. Nazari, M. R. & Hasbullah, A. H. (2010) Radio as an Educational Media: Impaction Agricultural Development, The Journal of the South East Asia Research Centre for Communication and Humanities, 2:13-20.
10. Obidike, N, A (2011). Rural Farmers' Problems Accessing Agricultural Information: A Case Study of Nsukka Local Government Area of Enugu State, Nigeria, *Library Philosophy and Practice*, ISSN 1522-0222.
11. Rogers, E. M. (2003) Diffusion of innovations, fifth edition: 576.
12. Schmidt, C S; Gorman, T J; Gary, M S, and Bayor A A, (2012). *Impact of Low-Cost, On-Demand Information Access in a Remote Ghanaian Village*, USCA Annenberg School for Communication & Communication & Journalism, 8(2):85–100.
13. Sharafat, A. A. (2012) Effectiveness of Agricultural Extension Activities, American Journal of Agricultural and Biological Sciences 7 (2):194-200.
14. The General Corporation for Radio and Television (2018), Radio Sector General Archive:234
15. Technology Transfer and Extension Administration, Kassala State (2017). Annual Report 2017: 120.
16. The General Corporation for Radio and Television (2018), Television Sector General Archives:205
17. Yahia, M. Z. (2014) Effectiveness of Radio and Television Extension Programs in the Dissemination of Recommended Agricultural Technologies in Sudan, University of Khartoum (PhD thesis): 257.
18. Yahia, M. Z. (2017) Impact of Farmers' Field Schools Approach on Crop Productivity in Khartoum State, Sudan, New York Science Journal 2017;10(12): 104-109.
19. Yahia, M.; Bello, A. and Bannaga, A (2017) The Effect of Features of Agricultural Radio and Television Programs on Farmers' Follow up to These Programs in Sudan. *International Journal of Advanced Research (IJAD)*.5(5), 1071-21.