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Agricultural information sources used for climate change adaptation in Tanzania

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Abstract

Purpose – The purpose of this paper is to assess sources of agricultural information used by farmers for climate change adaptation in the semi arid areas of Tanzania.

Design/methodology/approach – Mixed quantitative and qualitative methods were deployed. Semi-structured interviews were used to collect qualitative and quantitative data from 100 farmers in three selected wards in Chamwino district in Tanzania. Focus groups were also used to collect qualitative data from 30 farmers in the same wards.

Findings – The results showed that the major sources of information for farmers were predominantly local (neighbours and friends), followed by public extension services. Apart from radio and cell phones, advanced technologies (i.e. internet and e-mail) and printed materials were not used in the study area, despite their existence in the communities.

Research limitations/implications – The study necessitates a need to conduct regular studies on preferred information source of agricultural information and knowledge, development of technologies and use multiple sources of knowledge and information (such as print and mass media) to deliver relevant information to farmers to enable them to adapt to climate change.

Originality/value – The study provides a deep understanding of sources of agricultural information used by farmers in the semi arid area, which necessitates a need for demand-led and client-based information services, in order to meet the disparate farmers' needs in this regime of climate change. These findings can serve as an example for the increasing use of mixed quantitative and qualitative in information research.

Keywords Tanzania, Agriculture, Farmers, Information media, Climate change, Information services, Climate change adaptation, Source of information, Semi arid

Paper type Research paper

Introduction

Agriculture is identified as one of the areas most vulnerable to climate change (Mwandosya *et al.*, 1998). This means that most of the countries including Tanzania suffered on maintaining the food security. The emergence of the climate change, which has an impact on agriculture, indicates that farmers need access to agricultural information which will enable them to make appropriate decisions for adapting to climate change. Access to agricultural information enables people to make informed decisions (Manda, 2002) and hence enable them to adapt to climate. Various studies

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have revealed that there is a positive relationship between the increased flow of knowledge and information and agricultural development (Fawole, 2008).

However, most African countries have not devoted their efforts to the dissemination of knowledge and information to enable farmers to adapt to climate change (Paavola, 2003). This means that, despite the availability of information with regard to adaptation measures supporting climate change adaptation in the agricultural sector, information is not being used or optimally accessed by farmers. Ludi (2009) stated that "Among the adaptation options in agriculture is adequate information and knowledge about the availability and suitability of resources to promote sustainable agriculture".

There are various sources of agricultural information such as fellow farmers, agricultural extension, print material such as leaflets, brochures, newspapers and books, and ICT sources such as radio, television and internet. Mntambo (2007) points out that radio is the most important way of reaching farmers in developing countries. Radio is still the most appropriate communication technology available for most people, particularly rural communities. According to Manda (2002) farmers use printed materials such as newsletters, leaflets, brochures, newspapers and books to access agricultural information. However, these sources of information are expensive and their effectiveness depends upon the level of literacy and communicative nature of the people. In areas with a high rate of literacy this medium is very effective if certain pre-conditions including a good level of education among farmers are met (Wambura, 1992). Also resource poor farmers are mainly affected by the digital divide which is a gap between groups or individuals in their ability to use ICTs effectively due to differing literacy, technical skills and useful digital content (Ghatak, 2007). Nevertheless, the emergence of low-cost ICTs (such as radio, cell phones and the media provided by the telecentres) may bridge the digital divide (Lwoga and Ngulube, 2008).

Given the fact that there are disparities to the accessibility and effectiveness of the different sources of agricultural information especially in the developing countries, it is also important to investigate the application of these tools for the improved farming activities in enabling farmers to adapt to climate change. In this paper the significance of involving recipient for improving access to agricultural information for climate change adaptation is examined. An assessment on how agricultural information is currently delivered provides an environment for evaluating how information specialist may facilitate climate change adaptation by making sure appropriate agricultural information reaches the farmers in an appropriate format and content.

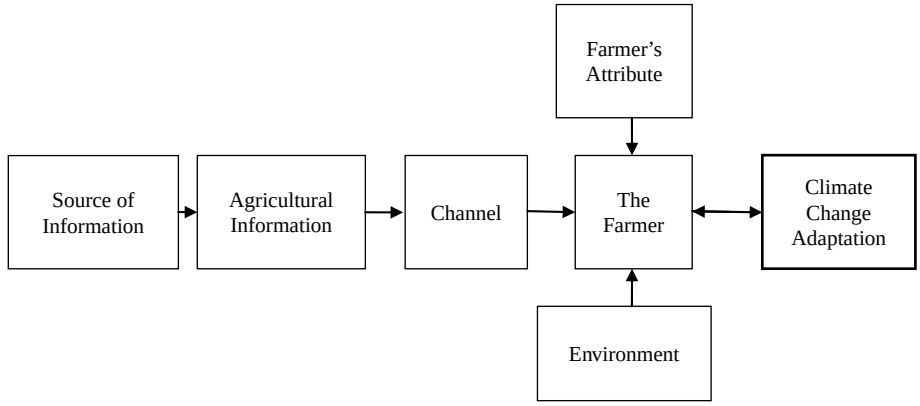
This study was meant to bring forward the significant of agricultural information reaching the farmers through the appropriate sources of information. This can increase their knowledge base and make them active participate in poverty eradication and making informed choices with regard to climate change adaptation. The overall aim was to examine information dissemination for climate change adaptation focus on information preferences. The specific objectives were to identify the sources of agricultural information for climate change adaptation accessible, identify the reliability of the various disseminating channels sources of information in climate change adaptation and to find appropriate source of disseminating agricultural information in climate change adaptation.

Theoretical framework

Based on the specific objectives of this study, a modified Berlo (1960) model was adopted for the study. This model was adopted because it focuses on the four fundamental elements of communication, which are source, message, channel and receiver. The receiver in this study is the farmer, the message being the agricultural information being delivered and the last element is the source which is the sender of the agricultural information. The information accessed by farmers will impart to them the knowledge and skills which will enable them to adapt to climate change. Included in the framework are the farmer's attributes and environment because they influence access to and use of agricultural information for climate change adaptation. The farmers' attributes are indicated by age group, literacy, gender, socio-economic category, knowledge of existing innovation and attitudes towards the agricultural innovations while the environment is indicated by infrastructure and geography that enable farmers to access information (Figure 1).

Literature review

Information sources refer to the point at which information can be accessed (Choo, 1999). It can be a primary, secondary or tertiary source. Farmers access information from various sources, such as agricultural demonstrations, printed materials including leaflets, brochures, newspapers and magazines, broadcasting media, such as radio and television, extension services, oral or group discussions, visual aids and using fellow farmers. Sheba (1997) states that "In most of the developing countries the farmer's sources of agricultural information depend to a large extent on agricultural extension services offered free by the government through extension officers." However, there are an inadequate number of agricultural officers. The extension officers are few and cannot make visits to an individual when required to do so (Sheba, 1997). The ratio of extension workers to farmers is 1:2800 (Sheba, 1997). Contrary, Rivera (2007) stated that "in developed countries such as Europe, agricultural information is becoming a price commodity and the provision of agricultural knowledge is increasingly becoming information transfer". Printed materials such as newsletters, leaflets, brochures, newspapers, books and many others are good sources of agricultural information for



Source: Berlo's model (1960) with slight modification

Figure 1.
Diagrammatic representation of the conceptual framework

farmers to make them informed of new ideas and innovations and to provide them with general information about agricultural practices (Manda, 2002; Matovelo, 2008; Mchombu, 2003). However, these sources of information are expensive and their effectiveness depends upon the level of literacy and communicative nature of the people. In areas with a high rate of literacy this medium is very effective if certain pre-conditions including a good level of education among farmers are met (Wambura, 1992).

Broadcasting media such as television and radio are also good at transmitting agricultural information. However, there some drawbacks with regard to these sources of information. First the broadcast media such as television and radio are expensive and most farmers cannot afford to buy them. Second, timing of the information is another problem. To access the information, farmers have to be listening or watching at the same time the programme is broadcast. In Tanzania radio are popular and useful for the dissemination of agricultural information. They have a good coverage, they are affordable and they use *Kiswahili* language in order to disseminate agricultural information. Mntambo (2007) also points out that radio is the most important way of reaching farmers in developing countries. Ozowa (1995) mentioned that, when used effectively, radios can provide general information about agriculture quickly and accurately to a large number of farmers, making them aware of agricultural information which aims at improving agricultural production.

Conversation about different agricultural innovations/technology comes about through spoken words. A large percentage of rural people have low economic and social status characterised by low literacy levels, which hinders them from understanding the information provided in written form. They prefer to obtain their information through oral discussions. In a study carried out by Bembridge and Tshikolomo (1992) and Leach (2001) as cited by Stefano *et al.* (2005), they found that oral forms are clearly favoured by rural communities because of long oral traditions and relatively low levels of literacy.

Contact with fellow farmers involves the exchange of the views, ideas and innovation from one farmer to the other. This is supported by the study carried out by Banmeke and Ajayi (2007), who found that fellow farmers are among the sources of agricultural information. In Tanzania, a study carried out by Bilonkwanamagara (2008) revealed that almost all villages in Tanzania have centres which farmers attend and whereby they interact informally to discuss various issues prevailing in their area, including agriculture. Mbwana (1994) asserted that in Tanzanian villages, farmer-to-farmer contact have served as an instrument for diffusing technological knowledge. Manda (2002), mentioned, in order of importance, that the sources of agricultural information most often used are: peer farmers and the radio. On other hand, the major negative aspects of farmer-to-farmer contacts in relation to information flow are their social and personal characteristics and lack of education that have an impact, especially in developing countries.

Library and information centres have frequently been recommended by various scholars in developing countries, including Manda (2002), Sheba (1997) and Okiy (2003). However, studies show that the provision of library and information services in Africa to date has focused more on urban areas; hence there a serious neglect rural areas which comprise of most of the people who are engaged in agricultural activities (Adimorah, 1986).

Field demonstrations is another import source for agriculture information. Van de Ban and Hawkins (1996) asserted that demonstrations may stimulate farmers

to try out innovations for themselves. In countries where the mass media play a limited role because of illiteracy or limited access to media outlets, demonstrations are very important for making people aware of innovations (Van de Ban and Hawkins, 1996).

Literature has revealed that farmers access agricultural information from various sources such as radio, television libraries, extension workers, contact with fellow farmers from the print material such as leaflets, magazine and newsletters very important for economic development and hence poverty alleviation in a country. Information sources will attract the attention of the end-users when they address the real problems faced by the farmers and provide feasible solutions to their needs and interests as well as offering options and facilitating decision making. Moreover, information can be used effectively if it encourages the adaptation of technology to the local situation, provides a more explicit treatment of sustainability in relation to the technical content, and provides guidance on the economic and financial implications of any recommended technologies (Ponniah *et al.*, 2008). In Tanzania, like in all other developing countries, dissemination of agricultural information depends much on the agricultural extension workers. In addition, in this climate change regime agricultural information is an important ingredient to enable farmer to adapt to climate change. There is, however, little scientific evidence in specific agricultural information sources preferred by farmers to enable them to adapt to climate change.

Research methodology

The research design adopted for the present study is cross-section. Three villages from three wards from Chamwino district in Dodoma region were studied. Dodoma region was chosen because is semi-arid areas relies on rain-fed agriculture thus it is vulnerable to impact of climate change. These villages were Kilangali II, Buigiri and Mvumi Makulu.

Multi stage simple random sampling technique was used to draw the sample of the wards and villages that were involved in the survey. The first sampling stage employed the random sampling techniques to select three wards from 28 wards. A list of the names of all the wards in each division was obtained from the national census document (United Republic of Tanzania, 2005). After selecting the ward the next stage was to select villages. From the list of villages in each ward, one village was randomly selected, namely Buigiri, Kilangali II and Mvumi Makulu. The sampling process required the development of a sampling frame, which in this study was the current list of all farmers in the selected villages contained in the household list in the government office in collaboration with the Village Executive Officer (VEO) in each village. The simple random selection technique was used in order to increase validity and reduce bias.

Data were collected from the respondents through the use of a semi-structured interview schedule. The interview schedule contain the theme base on the objective of the study which was available of agricultural information for climate change adaptation, reliable and appropriate sources of to convey agricultural information for climate change adaptation. To determine farmers' reported sources of information on climate change adaptation, a list of information sources was presented to the respondents with response options of "yes" and "no" to indicate which of the sources major sources of information on climate change adaptation were. To determine the appropriateness

of the various disseminating channels which were radio, television, library and information centre, newspapers, seminars and workshops, training programmes, magazines, relatives, friends and neighbours, fellow farmers, agricultural extension officers, leaflets, agricultural demonstrations, posters, cell phones, landlines, village meetings and savings cooperatives, a four-point Likert-type scale with options ranging from "not appropriate", "fairly appropriate", "appropriate", and "very appropriate" and scaled 1-4, respectively, was used. To ascertain the opinion of the farmers regarding the reliability of the various sources of information in communicating information on climate change adaptation, a four-point Likert-type scale of "not reliable", "fairly reliable", "reliable" and "very reliable", scaled 1-4 were used. Responses of the four-point scales were later categorised according to their mean scores using the methodology of Anyanwu *et al.* (2002). In terms of reliability of information sources, sources of information with mean scores of 2.5 or above were classified as more reliable sources, while those with mean scores of below 2.5 were regarded as less reliable sources of information. Also, information sources with mean scores of 2.5 or above were regarded as appropriate sources while those with mean scores of below 2.5 were regarded as inappropriate sources. A total of three focus group sessions were held in the surveyed villages, and one focus group session was held per village. The focus group discussion and interview data were studied and analysed as they were collected, until it was clear that perspectives were being repeated and data saturation had been reached (Teddlie and Tashakkori, 2009). The quantitative data collected was coded and summarised prior to analysis by using the Statistical Package for Social Sciences (SPSS). The researcher utilized descriptive statistics, such as frequencies, percentages in data analysis. Qualitative data was analysed using content analysis.

Results

Sources of agricultural information about climate change

The results shown in Table I revealed that relatives, friends and neighbours (96 per cent), fellow farmers (96 per cent) and agricultural extension officers were the

Source of information	Percentage of farmers Yes	No
Radio	84	16
Television	5	95
Library and information centre	27	73
Newspapers	25	75
Seminars and workshops	24	76
Training programmes	19	81
Magazines	28	72
Relatives, friends and neighbours	96	4
Fellow farmers	96	4
Agricultural extension officers	90	11
Leaflets	27	73
Agricultural demonstrations	32	68
Posters	17	83
Cell phones, landlines	19	81
Village meetings	83	17
Savings cooperatives	1	99

Table I.
Sources of agricultural information about climate change

major sources of agricultural information in climate change. Use of television (5 per cent), newspaper (25 per cent) and posters (17 per cent) were reported by few respondents as the sources of agricultural information in adapting climate change.

Reliability of various channels of information

Respondents were asked to state on each available source their opinion with regard to their reliability in a scale 1-4 (1 – very reliable, 2 – reliable, 3 – fairly reliable and 4 – not reliable). Based on the findings in Table II, it shows that the farmers perceived relatives, friends and neighbours ($x = 3.57$) and fellow farmers ($x = 3.57$), as the most reliable sources of information on climate change adaptation. Also news radio ($x = 2.86$) and extension worker ($x = 2.60$) were perceived as reliable sources of information by the farmers. While savings leaflets ($x = 1.26$), agricultural demonstrations ($x = 1.21$), training programmes ($x = 1.18$), seminars and workshops ($x = 1.17$), television ($x = 1.15$) and posters ($x = 1.15$) were not found to be reliable channels of disseminating agricultural information for climate change adaptation.

Appropriateness of the various disseminating channels of information in climate change adaptation

The result of the responses of the farmers as regard appropriateness of the various disseminating channels is shown in Table III. The table revealed that the most appropriate channel as perceived by the farmers were agricultural demonstrations ($x = 3.93$). Agricultural extension officers ($x = 3.92$), training programmes ($x = 3.88$), seminars and workshops ($x = 3.80$), savings cooperatives ($x = 3.67$), television ($x = 3.67$), radio ($x = 3.63$), library and information centre ($x = 3.34$) were also perceived as appropriate sources with high mean scores. Other perceived appropriate sources include posters ($x = 2.97$), newspapers ($x = 2.92$), leaflets ($x = 2.92$) and village meetings ($x = 2.92$).

Table II.
Mean scores of farmers' opinions on the reliability of the various disseminating channels sources of information in climate change adaptation

Sources of information	Mean (x)	SD
Radio	2.86	1.15
Television	1.15	0.60
Library and information centre	1.99	1.40
Newspapers	1.23	0.52
Seminars and workshops	1.17	0.40
Training programmes	1.18	0.48
Magazines	1.51	1.00
Relatives, friends and neighbours	3.57	0.83
Fellow farmers	3.57	0.83
Agricultural extension officers	2.60	1.13
Leaflets	1.26	0.62
Agricultural demonstrations	1.21	0.48
Posters	1.15	0.36
Cell phones, landlines	1.45	0.97
Village meetings	2.13	0.85
Savings cooperatives	2.33	1.53

Sources of information	Mean (x)	SD
Radio	3.61	0.75
Television	3.63	0.75
Library and information centre	3.34	0.99
Newspapers	2.92	1.19
Seminars and workshops	3.80	0.58
Training programmes	3.88	0.54
Magazines	2.77	1.16
Relatives, friends and neighbours	2.81	0.96
Fellow farmers	2.81	0.96
Agricultural extension officers	3.92	0.40
Leaflets	2.92	1.19
Agricultural demonstrations	3.93	0.36
Posters	2.97	1.14
Cell phones, landlines	2.60	0.97
Village meetings	2.86	0.94
Savings cooperatives	3.67	0.52

Table III. Mean scores of farmers' opinions on the appropriateness of the various disseminating channels sources of information in climate change adaptation (mean (x))

Challenges faced by respondents in accessing agricultural information

The respondents were asked to mention the challenges they encountered in accessing agricultural information about climate change. Their responses are indicated in Table IV, showing that the challenges faced by respondents in accessing agricultural information were lack of infrastructure (89.5 per cent), lack of information services (83.2 per cent), time of accessing information (72.6 per cent), access to outdated information (66.3 per cent), cost of accessing information (61.1 per cent), lack of power (5.3 per cent) and language barrier (34.7 per cent).

Discussion

Sources of agricultural information about climate change

Relatives, friends and neighbours, fellow farmers and agricultural extension officers were the major sources of agricultural information for climate change adaptation. The implication here is that interpersonal and meeting were perceived as most frequent sources of agricultural information in climate change, probably because of the possibilities of immediate feedback and multiplier effects of these methods. The research results indicate that rural dwellers do not have access to modern information technology such as the internet, information centres or libraries. The fact that modern information sources such as internet were the least channels of disseminating

Problem	%
Language barrier	35
Cost of accessing information	61
Access to outdated information	66
Time of accessing information	73
Lack of information services	83
Lack of infrastructure	90
Lack of power	5

Table IV. Challenges faced by respondents in accessing agricultural information

information to the farmer's points to the need for having an enabling environment for such modern information communication technologies to thrive in the area. According to Agwu and Chah (2007) the internet is a formidable source of information; and information on recent developments in the field of agricultural extension can be readily obtained from the internet.

Reliability of various channels of information

The results shows that relatives, friends and neighbours and fellow farmers were the most reliable sources of information on climate change adaptation, while agricultural demonstrations, training programmes, seminars and workshops, television and posters were not found to be reliable channels of disseminating agricultural information for climate change adaptation. These findings show that respondents relatives, friends and fellow farmers as sources of information that are most reliable. An earlier study by Anyanwu *et al.* (2002) reported that farmers in Orumba North LGA of Anambra state received their farm information from non-professional inter-personal sources more often than from mediated and professional inter-personal sources. This therefore, calls for more commitment on the part of the extension agencies in their role of information dissemination activities.

Appropriateness of the various disseminating channels of information in climate change adaptation

The result of the responses of the farmers as regard to appropriateness of the various disseminating channels is shown in Table III. The table revealed that the most appropriate channel as perceived by the farmers was agricultural demonstrations. Van de Ban and Hawkins (1996) had earlier observed that demonstrations allow farmers to observe, hear and learn by doing. In countries where the mass media play a limited role because of illiteracy or limited access to media outlets, demonstrations are very important for making people aware of innovations. Agricultural extension officers, training programmes, seminars and workshop library and information centre were also perceived as appropriate sources with high mean scores. The fact that they indicated radio, training, cooperative and extension agents among the most appropriate channels may be as a result of the wide coverage of radio as well as the fact that messages from extension agents most often enhance adoption of innovations for climate change adaptation.

Challenges faced by respondents in accessing agricultural information

The majority of the respondents indicated that lack of infrastructure was one of the challenges encountered in accessing agricultural information in their area. They further pointed out that in the study area they do not have an information centre and a place for selling agricultural materials. In an in-depth interview in Kilangali II village, one respondent commented as follows:

> If a library and information centre were extended to our area we would be able to access agricultural information in the form of printed materials such as books, leaflets, research reports, newsletters, and many others but we don't have any.

In an interview with respondents from Mvumi Makulu, one respondent stated that "Our library lacks agricultural information supporting climate change adaptation." This is an indication that respondents were eager to make use of these resources,

but unfortunately, they were not available. Also respondents pointed out that no information has available from agricultural demonstrations or exhibitions because they were not conducted in their area. The exhibitions such as Nane Nane were conducted in Dodoma municipality, to which farmers could not afford to travel to attend demonstrations. In an interview with respondents in Kilangali II one farmer said that "it is expensive to travel to Dodoma town to attend demonstrations because I would need enough money for transport, food and accommodation." This shows that rural people are interested in attending exhibitions, even those which do not take place in their locality, but they fail to attend them due to lack of funds. It was also found that language barrier was among the other they encounter. It was found that some of the agricultural materials are written in English which most of the farmers are not conversant with. It was also found that some of the farmers can only use local language hence they are not able to access information conveyed in Kiswahili which is the national language. This is in line with findings by Abubakar *et al.* (2009) who found that barrier to information accessibility are caused by language barriers.

Research limitations/implications

The study necessitates a need to plan agricultural information sources that would enable farmers to receive information relevant for climate change adaptation, create awareness of agricultural information sources and knowledge, development of technologies and use multiple sources of knowledge and information (such as print) in the format and the content that can be accessed and consumed by farmers to deliver relevant information to farmers to enable them to adapt to climate change.

Conclusion and recommendations

It can be concluded that access to relevant agricultural information is very important to enable farmers to adapt to climate change in the rural areas. The study findings revealed that most farmers received their agricultural information through mediated and professional inter-personal methods. Major reliable channels of disseminating agricultural information for climate change adaptation were neighbours and fellow farmers, radio and extension workers. Further analysis showed that agricultural demonstrations were perceived as most appropriate sources in climate change adaptation. Consequently, the study found that challenges faced by respondents in accessing agricultural information were lack of infrastructure, lack of information services, time of accessing information, access to outdated information, cost of accessing information, lack of power and language barrier. The findings revealed that farmers continued to rely on neighbours, fellow farmers, radio, extension workers and radio more than printed materials and advanced ICTs such as internet to access agricultural information for climate change adaptation.

Based on the findings, the following recommendations were made.

The establishment of agricultural libraries and information centres in rural areas would ensure that suitable and relevant agricultural information concerning the impact of climate change is given to the farmers, in terms of its language, content and format so that it can be accessed by them.

Multiple sources of agriculture information. Researchers, educators, extension agents, agricultural support services should use various sources of agricultural information (such as face-to-face, print and ICTs) to deliver relevant information to farmers in this era of

climate change. For instance, the public and private organisations should establish community radio that combines vernacular languages to disseminate relevant knowledge to farmers. Print formats (such as leaflets, newsletters, books) and ICTs such as internet, e-mails and cell phones can also be used to share and distribute knowledge among farming communities to supplement what was gained verbally to the farmers.

The government should also assist farmers in the area of education, for instance, sponsoring adult education so that farmers can make use of the different sources of agricultural information effectively.

For further study, this paper recommends research to be undertaken to determine the effectiveness of the useful informal sources of agricultural information, such as contact with fellow farmers and friends in supporting climate change adaptation in rural areas.

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Appendix 1. Focus group discussion guide

- What sources of agricultural information are available on climate change in Chamwino district?
- What kind of agricultural information is conveyed by available sources under climate change adaptation?
- How do farmers in Chamwino access and use agricultural information under climate change to adapt to climate change?
- Which sources of information do you prefer most?
- What challenges are encountered by farmers in Chamwino in accessing agricultural information under climate change?
- What strategies can be used to overcome the identified challenges in accessing and using agricultural information under climate change?

Appendix 2. Interview guide for extension/agricultural officers/village executive officers

A. Researcher's Brief Introduction and Purpose of the Study.

I am a graduate student at the University of Dares Salaam, pursuing a Masters of Arts in Information Studies. The Interview is part of a study being conducted for a dissertation which will be presented to the University in partial fulfillment of the Degree Programme.

The purpose of this Interview is to help to gather data that will be used to examine "***Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamw ino District"***.

May I have your attention on discussing several issues related to the topic. The information you give is strictly confidential, and the study is mainly for academic purpose only and not otherwise. Findings of this study will improve the quality of information delivery systems and services in supporting climate change adaptation for Farmers in Chamwino District in particular, and Tanzania in general.

Thanking you in advance for the time you will spend and all the efforts you will make to respond to this Interview Session.

1. Name of your Institution……
2. Designation……
3. Gender
   (a) Male
   (b) Female
   (c) Single (Male
   (d) Single (Female)

(*continued*)

4. Level of Education :

    (a) Certificate

    (b) Diploma

    (c) Degree

    (d) Higher Degree

    (e) Others (Specify) :……

5. What are the sources of agricultural information available in Chamwino District?

    ……..

6. What type of agricultural information conveyed by the sources you mentioned in question 5 in supporting climate change adaptation at Chamwino? Mention them in order of priority:

    ……

    ……

    ……

7. Mention sources of agricultural information on climate change which are frequently consulted by farmers in Chamwino?

    ……

    ……

8. Do you think that the agricultural information Farmers get in Chamwino is enough to improve efficiency and productivity in the environment which needs climate change adaptation?

    (a) Yes

    (b) No

(*continued*)

9. If your answer to question 9 is “Yes” explain thoroughly:

……

……

10. If your answer to question 8 is “No” explain thoroughly:

_____

……

11. What are the reliable sources of agricultural Information in climate change adaptation among the mentioned sources?

12. What do you think are the appropriate sources of disseminating agricultural Information in climate change adaptation?

13. What should be done so that Farmers can get adequate, correct and timely agricultural information on climate change adaptation in Chamwino?

…….

THANK YOU FOR YOUR COOPERATION!

Appendix 3. Farmer's questionnaire

Dear respondents,

I am doing research on " ***Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamwino District "*** .Kindly, I would like to invite you to participate in this study by filling in this questionnaire. The information collected will be used for academic purpose only;confidentiality of information will be maintained.

Please express your honest opinion about the subject. Your views are valuable and of significance to the survey being conducted. The findings will help in improving 'Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamwino District in particular, and Tanzania in general. **Please use a ball point pen to fill in this questionnaire.**

District Profile:

Name of District: Chamwino
Name of Region: Dodoma

Name of Ward: …….

Name of Village……...

Personal information

1. Gender (1) Male (2) Female

2. What is Your Age Group? _____

1) Below 20 years

2) 20 – 30 years

3) 30 – 40 years

4) 40 – 50 years

5) 50 – 60 years

6) Above 50 years

(*continued*)

3. Marital Status of Respondents:

(1) Married (2) Single (3) Separated (4) Widowed.

4. What is your Marriage Type? (1) Monogamous(2) Polygamous

5.Did you get any formal education (1) Yes (2) No

6.Are you able to read? (1) Yes (2) No

7. What is you highest level of education?

1) Never Attended School (No Formal Education)

2) Adult Education

3) Semi (Memkwa)

4) Primary Education

5) Secondary Education

6) Post Secondary Education

7) Other (Please Specify):……..

8. What is your main source of Income?

1) Employee

2) Farming activities

3) Self Employment

4) Other (Please Specify):……..

9. Mention the main kinds of crops that you grow in your area:

1) Maize

2) Beans

3) Sorghum,

4) Bulrush,

5) Millet,

6) Paddy,

(*continued*)

7) Ground nuts

8) Sweet potatoes.

Agricultural Information About Climate Change

10. Have you ever heard of new farming practices aimed at adapting to climate change?

(1) Yes (2) No

11. If your answer to question 10 is "No" how do you adapt agricultural practice to climate change?

……

Sources and Accessibility of Agricultural Information Expressing Climate Change Adaptation:

12. What Sources and Channels of Information area vailable in your area that provide agricultural information supporting climate change adaptation? Tick(√) one from the list for all the categories that apply:

Category	
Radio	
Television	
Library & Information Centre	
Newspapers	
Seminars and Workshops,	
Training Programmes	
Magazines	
Relatives, Friends and Neighbours	
Fellow Farmers	
Agricultural Extension Officers	
Leaflets	
Agricultural demonstrations	
Posters	
Cell phones, landlines	
Others: …….	

(*continued*)

13. What Sources of Information and Channels do you mostly use to get agricultural information supporting climate change adaptation? For each of the following sources and channels indicate if you use them by Circling against the following: **Almost Always, Always, Frequently, Occasionally, Rarely and Never**. Circle the appropriate answers. Circle the Source or Channel that applies (Indicate one answer only for each Source/Channel):

	Almost Always	**Always**	**Frequently**	**Rarely**	**Never**
Radio	(v)	(iv)	(iii)	(ii)	(i)
Television	(v)	(iv)	(iii)	(ii)	(i)
Library & Information Centre	(v)	(iv)	(iii)	(ii)	(i)
Newspapers	(v)	(iv)	(iii)	(ii)	(i)
Seminars and Workshops,					
Training Programmes	(v)	(iv)	(iii)	(ii)	(i)
Magazines	(v)	(iv)	(iii)	(ii)	(i)
Relatives, Friends and Neighbours	(v)	(iv)	(iii)	(ii)	(i)
Fellow Farmers	(v)	(iv)	(iii)	(ii)	(i)
Agricultural Extension Officers	(v)	(iv)	(iii)	(ii)	(i)
Leaflets	(v)	(iv)	(iii)	(ii)	(i)
Agricultural Demonstrations	(v)	(iv)	(iii)	(ii)	(i)
Posters	(v)	(iv)	(iii)	(ii)	(i)
Cell Phones, Landlines	(v)	(iv)	(iii)	(ii)	(i)
Others:…….	(v)	(iv)	(iii)	(ii)	(i)

14. How do you rate the accessibility of the available sources of information in your area that provides agricultural information supporting climate change adaptation?

(1) Highly accessible (2) Moderately accessible (3) Not accessible

(*continued*)

15. What is your opinion regarding the reliability of the various sources of information in communicating agricultural information for supporting climate adaptation?

For each of the following sources and channels indicate if you use them by Circling the following;

not reliable, fairly reliable, reliable and very reliable

	Very reliable	**Reliable**	**Fairly reliable**	**Not reliable**
Radio	(iv)	(iii)	(ii)	(i)
Television	(iv)	(iii)	(ii)	(i)
Library & Information Centre	(iv)	(iii)	(ii)	(i)
Newspapers	(iv)	(iii)	(ii)	(i)
Seminars and Workshops,				
Training Programmes	(iv)	(iii)	(ii)	(i)
Magazines	(iv)	(iii)	(ii)	(i)
Relatives, Friends and Neighbours	(iv)	(iii)	(ii)	(i)
Fellow Farmers	(iv)	(iii)	(ii)	(i)
Agricultural Extension Officers	(iv)	(iii)	(ii)	(i)
Leaflets	(iv)	(iii)	(ii)	(i)
Agricultural Demonstrations	(iv)	(iii)	(ii)	(i)
Posters	(iv)	(iii)	(ii)	(i)
Cell Phones, Landlines	(iv)	(iii)	(ii)	(i)
Others:…….	(iv)	(iii)	(ii)	(i)

(*continued*)

16. What is your opinion regarding the appropriateness of the various sources of information in communicating agricultural information for supporting climate adaptation? For each of the following sources and channels indicate if you use them by Circling the following; **not appropriate, fairly appropriate, appropriate, and very appropriate**

	Very appropriate	**Appropriate**	**Fairly appropriate**	**Not appropriate**
Radio	(iv)	(iii)	(ii)	(i)
Television	(iv)	(iii)	(ii)	(i)
Library & Information Centre	(iv)	(iii)	(ii)	(i)
Newspapers	(iv)	(iii)	(ii)	(i)
Seminars and Workshops,				
Training Programmes	(iv)	(iii)	(ii)	(i)
Magazines	(iv)	(iii)	(ii)	(i)
Relatives, Friends and Neighbours	(iv)	(iii)	(ii)	(i)
Fellow Farmers	(iv)	(iii)	(ii)	(i)
Agricultural Extension Officers	(iv)	(iii)	(ii)	(i)
Leaflets	(iv)	(iii)	(ii)	(i)
Agricultural Demonstrations	(iv)	(iii)	(ii)	(i)
Posters	(iv)	(iii)	(ii)	(i)
Cell Phones, Landlines	(iv)	(iii)	(ii)	(i)
Others:…….	(iv)	(iii)	(ii)	(i)

(*continued*)

17. How would you prefer to obtain agricultural information for adapting to climate change? Please rank the means below according to your preferences by assigning numbers (i) **for the most preferred, (ii) for slightly preferred and (iii) for not preferred at all**.Circle all items that apply to you.

Category	**Most Preferred**	**Slightly Preferred**	**Not Preferred at all**
(a) Through Extension OfficersVisits/ Consultations	(i)	(ii)	(iii)
(b) Through Attending Agricultural Exhibitions	(i)	(ii)	(iii)
(c) Through Audio Programmes	(i)	(ii)	(iii)
(d) Through Television and Radio Programmes	(i)	(ii)	(iii)
(e) Talking to Friends, Relatives, Neighbours ad Fellow Farmers	(i)	(ii)	(iii)
(f) Reading About Them on Newspapers Magazines and Leaflets	(i)	(ii)	(iii)
(g) Through Field Demonstrations	(i)	(ii)	(iii)
(h) Other (Specify): ……	(i)	(ii)	(iii)

(*continued*)

18. Which language do you prefer to use most each day in accessing agricultural information supporting climate change adaptation?

(a) Local Language (Vernacular)

(b) Kiswahili

(c) Any Other Language (Please Specify*)*:……

Types of Agricultural Information Conveyed by Accessible Sources Supporting Climate ChangeAdaptation:

19 .What agricultural information for adapting to climate change with regard to food production in the following areas are accessible from available sources? Please tick (√)

(a) Types of Seeds Resistant to Drought	
(b) Intercropping/Mixed cropping	
(c) Soil Management	
(d) Water Management	
(e) Irrigation System	
(f) Planting Trees	
(g) Early Warning System	
(i) Changing planting dates	
(j) Tradition diversification	
(j) other (Please specify)	

(*continued*)

Use of Agricultural Information to Adapt to Climate Change:

20. Have you ever practised or adopted any of the agricultural innovations you accessed?

a) Yes

b) No

21 .If your answer to question 17 is 'No', Please give a reason why you have never adopted the innovation:

22. If your answer is 'Yes' to question 17 which ones you have practiced in your agricultural activities?

a)Small-ScaleIrrigation.

b) Switching to Drought-Resistant Crops

c) Short-Term Crops

d) Planting of Trees.

e) Water Management

f) Traditional Diversification.

g) Other (Please Specify): _____

23. Do you think you would like to have information and learn about adapting your agricultural production?

a) Yes

b) No

c) Not Sure

24. If your answer to question 20 is "Yes" what subject areas would you like to know more about, please mention them:

a) Small-Scale Irrigation.

b) Switching to Drought-Resistant Crops

(*continued*)

c) Short-Term Crops

d) Planting of Trees.

e) Traditional Diversification.

f) Changing plant dates

g) Other (Please Specify):_____

25. Do you think the accessible sources of information have been successful in providing in formation on supporting climate change adaptation in the following areas? Please circle the appropriate answer accordingly by choosing each category identified below:

Category	Very successful	Successful	Uncertain	Less successful	Not successful
(a) Type of Seeds	(v)	(iv)	(iii)	(ii)	(i)
(b) Soil Management	(v)	(iv)	(iii)	(ii)	(i)
IWater Management	(v)	(iv)	(iii)	(ii)	(i)
(d) Irrigation	(v)	(iv)	(iii)	(ii)	(i)
(e) Tradition Diversification	(v)	(iv)	(iii)	(ii)	(i)
(f) Planting Trees	(v)	(iv)	(iii)	(ii)	(i)
(g) Mixed crops	(v)	(iv)	(iii)	(ii)	(i)
(h) Changing planting dates	(v)	(iv)	(iii)	(ii)	(i)
(i) Tradition diversification	(v)	(iv)	(iii)	(ii)	(i)
(i) Other…….	(v)	(iv)	(iii)	(ii)	(i)

(*continued*)

Challenges Encountered in Accessing Agricultural Information:

26. What challenges do you encounter in accessing agricultural information supporting climate change adaptation?

a) Language barriers

b) Cost of accessing information

c) Access to outdated information

d) Time consuming

e) Lack of information services

f) Lack of infrastructure

g) Others mention……

Suggestions for Over coming the Identified Challenges:

27. What strategies can be used to over come the identified challenges in accessing and using of agricultural information to support climate change adaptation?

……

……..…

…….

THANKS FOR YOUR COOPERATION

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