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Communication Methods in the Commercialization of Sericulture Technologies and Innovations in Uganda

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Abstract

The importance of communication for the successful development of new projects has been well documented. One of the hypotheses being tested in the commercialization of Sericulture Technologies and Innovations is that the success depends on effective communication. While it is an expensive process, we have observed that improving communication maximizes success and minimizes risks and has been useful in acquiring more land for expansion, more resources allocated to the project and more partners getting on board. Different subject matter specialists have come up with excellent agriculture programs/projects, but these interventions cannot succeed if they have not been properly communicated to the end user (the farmer) and all other key stakeholders. A survey in 26 different sericulture research stations was conducted for all stakeholders in Uganda with 170 questionnaires distributed but only 151 questionnaires satisfactorily completed and returned. Data analysis was done using the Statistical Product and Service Solutions (SPSS)19.0. The chi-square test showed that there was a high significant relationship between sex, geographical location of respondents to different communication methods used with p-value (0.0) below 0.05 while age of respondents had no significant relationship with communication method used with p-value (0.5) above 0.05. Effective communication was hindered by poor infrastructure (30.5%) in form of poor transport system, poor power supply, and shortage of knowledge and information centers and lack of communication materials (25.8%).

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This study identified a matrix of various communication methods used in the commercialization of sericulture technologies and innovations in Uganda, their strength and weaknesses and documented their importance in project success.

Key words: Sericulture; Commercialization; Technologies; Communication; Innovations.

1. Introduction

Communication is well known as a process of exchanging concepts amongst individuals through an organized system of signs and words [1]. Although communication is very difficult to master but a vital process in project management [2], it ensures proper and timely collection, production, dissemination and distribution of required project information to target consumers [3]. Project success and failure is directly related to effectiveness of communication in any organization and project set-up [4].

Agriculture contributes about 21.8% to Uganda's GDP hence making it vital in realization of growth and development targets through food security, income enhancement and employment [5]. Productivity potential in agriculture is not fully realized due to lack of farmers' access to inputs, technologies and relevant information [6]. There is also a need to investigate the role of communication in Agriculture due to realization of the gap between knowledge and action from research-extension-farmer linkages as a result of researchers limiting communication of research results to scientific fora such as journal publications and scientific conferences other than focusing the dissemination on the farming communities thus limiting the extent to which decision makers and key players formulate policies and projects, which eventually impact the farmers [7].

Information dissemination has a vital role in promoting agricultural development and production, effective communication helped to facilitate mutual relationship among farmers, agricultural scientists and extension workers [8]. One of the best ingredients of increased agricultural production and productivity are knowledge and information therefore access to agricultural Information contributes towards increased food production and income from agriculture. Studies have stated that mass media, commercials and government agencies and agents act as a major function for disseminating information about agriculture production. Agricultural information is necessary if farmers have to advance beyond their present level of production, a steady flow of accurate, understandable, factual information links the scientist with the farmer through the various sources that communicate such information [9].

In Uganda, despite 71 % and 43.2% of farmers demanding for extension services in crop and animal husbandry respectively, only 17% of crop and 21% of animal farmers were served by the extension services [10]. Implying that the existing public extension system is unable to provide extension services to the farmers whenever they are needed, necessitating private sector entry. In rural development concept, it is more vital to acknowledge transfer of useful ideas, skills, knowledge, technologies and innovations from one person to another using a cheap and common communication method as this holds capacity to improve the socio-economic livelihood of the sericulture farmers thus uplifting their literacy levels, incomes and health status. In Uganda, extension workers are the main actors known to implement a single spine extension system that trains farmers as well as

disseminating all useful ideas, skills and knowledge to the community. In order to develop a sustainable sericulture farming systems in Uganda, there is need to integrate research and innovation knowledge and technologies developed by researchers to farmers, industry and community. Due to poor rural financing of agriculture projects in Uganda, high ratio of number of farmers to extension staff, lack of facilitation to extension staff, challenges with different communication channels like shortage of power supply, language barriers therefore this paper mainly focused at studying different communication methods, their strengths and weaknesses. This helped at recommending appropriate communication methods that can be adopted by all stakeholders involved in commercialization of sericulture technologies and innovations in Uganda.

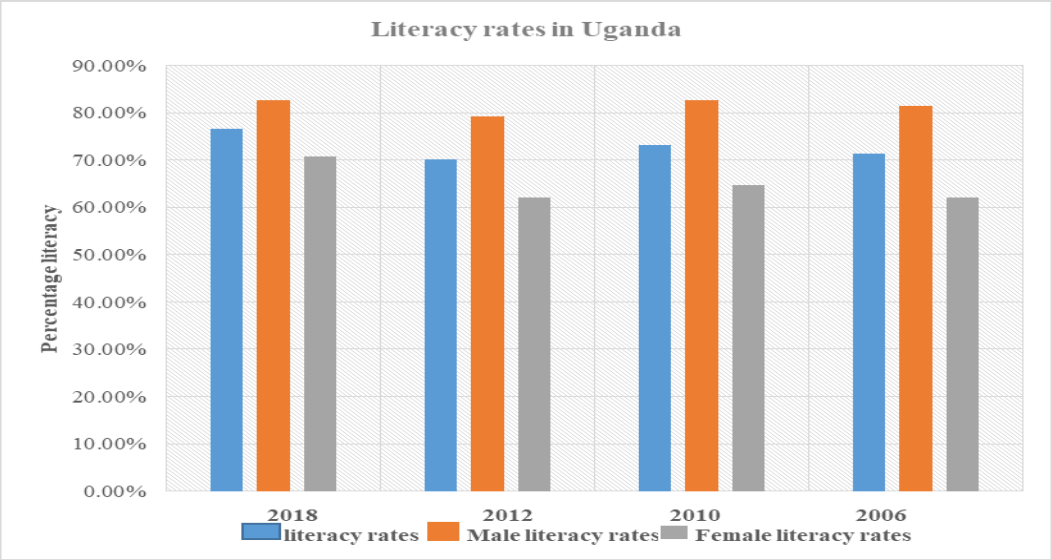

Figure 1

Literacy levels and mass media coverage in Uganda

CIA world factbook, 2020

Radio, Television and social media coverage in Uganda

Currently different platforms have documented diverse mass media sector and usage by the growing youthful population in Uganda. The Uganda Communication Commission report, 2018 showed that Uganda had 292 licensed radio stations, 33 operational Television stations and eight Pay TV service providers indicating potential growth from 200 radio stations reported by BBC Monitoring report, 2016. The BBC World Service's nationally representative survey, 2015, reported majority of the adult Ugandans had a working radio (87%) and mobile phone (74%) in their household. Only a third had a working TV (34%) and only 13% of the adult population had access to the internet within their household. According to Internet World Stats database almost three-quarters of the world population own a mobile phone with only 16% smart phones, Uganda had 19 million estimated internet users by December 2017. The digital report for Uganda, 2020 showed that 26.83million Ugandans (60%) had mobile connections, 10.67million (24%) using internet and 2.5million (5.6%) social media presence.

2. Materials and Methods

Questionnaire development

The initial design, order and questions used in this questionnaire were based on both past information and input from 20 interviewees/fellow staff at Tropical Institute of Development Innovations representing agricultural officers, sericulture farmers, and researchers. From this input, 32 questions were generated as a pre-survey test to address the communication methods used in the commercialization of sericulture technologies and innovations in Uganda. The pre-survey was carried out in February 2021 with 15 respondents. Based on their feedback, the questionnaire was refined further into the final survey of 24 questions that were used in this study.

The following questions were addressed through this survey:

1. In general, Communication understanding?

2. What are the different Communication methods used in sericulture?

3. What are the Strengths of different communication methods in sericulture?

4. What are the weaknesses of different communication methods in sericulture?

Survey

The survey offered a range of questions to determine the respondent's demographics, educational level, and knowledge about communication in sericulture production. The survey was conducted at 26 sericulture research stations between March - April 2021. The questionnaires were distributed altogether in 26 different venues. All questionnaires were handed out to individuals and collected after 10 min by research assistants and research officer.

Participants

A summary of the participants in the survey: Ugandan citizens over the age of 18 comprised of 26 TRIDI field officers, 15 agricultural extension staff, 10 TRIDI district supervisors, 4 TRIDI strategic supervisors, 45 casual labourers and 70 sericulture farmers from 26 research stations and in total 170 interviewees were involved in the study.

Approach to distribution

The field officers were trained as research assistants at each station to administer the questionnaire hence saved costs of hiring research assistants since field officers were more familiar with participants and clearly understood the purpose of this survey. While administering the questionnaire, participants filled out a questionnaire giving their opinions on the level of understanding of communication, different methods used to receive information. A total of 170 questionnaires were distributed during this 2-month period with 151

questionnaires satisfactorily completed and returned.

Statistical analysis

Analysis of the survey results was done using the software program package - Statistical Product and Service Solutions (SPSS) 19.0.

3. Results

The first section of the survey addressed the respondent's background and demographic characteristics, followed by 8 questions which mainly addressed their awareness, knowledge, and understanding of communication in sericulture, 8 questions addressed knowledge about different communication methods used in sericulture, and last section had a set of 8 questions which addressed both weaknesses and strengths of each of the communication methods studied during this survey.

3.1. Demographic characteristics of respondents

Table 1: Demographic characteristics of respondents.

Characteristics	Classification	Frequency	Percent (%)
Sex of respondents	Male	75	49.7
	Female	75	49.7
Age of respondents	Below 18	0	0
	19-30	43	28.5
	31-40	70	46.4
	41 and above	37	24.5
Geographical location of respondents	Eastern Uganda	35	23.2
	Northern Uganda	33	21.9
	Central Uganda	41	27.2
	Western Uganda	41	27.2

The respondents were selected from all regions of Uganda since Tropical Institute of Development Innovations has set up sericulture demonstrations and research stations in 26 districts of Uganda with equal number of males (49.7%) and females (49.7%). Most of the respondents had an average age ranging between 31-40 years (46.4%) most these being extension staff, farmers and some casual labourers, followed by age bracket of 19-30 years (28.5%) which were mostly field officers and casual labourers. In general, the age bracket revealed that 72.9% of the respondents were youth mainly gaining livelihood in form of employment in the sericulture sector as either casual labourers, casual workers and technical staff under the main project titled "commercialization of sericulture technologies and innovations in Uganda" being rolled out by Tropical Institute of Development Innovations (Table 1). These results suggested that the youth and women had a very positive attitude towards

sericulture development in Uganda as a major source of employment and income.

3.2. General understanding of Communication by respondents

Table 2: Communication understanding by respondents.

Characteristics	Classification	Frequency	Percent (%)
Communication meaning	Know a lot	20	13.2
	Know something	130	86.1
Communication barriers	Language barrier	37	24.5
	Sophisticated communication methods	28	18.5
	No communication materials	39	25.8
	Poor infrastructure	46	30.5
Sericulture information sources	Social media	15	9.9
	Extension staff	30	19.9
	Demonstration Farmers	21	13.9
	Research institutions	37	24.5
	Religious institutions	27	17.9
	radio and television	20	13.2
Role of communication in sericulture	Technology dissemination	28	18.5
	market information	27	17.9
	Extension advisory services	43	28.5
	Link research to farmers	30	19.9
	Farmer trainings	22	14.6
	Technology dissemination	28	18.5

As shown in Table 2, the respondents had knowledge about communication meaning, communication barriers, information sources and role of communication in sericulture in Uganda. This result suggested that the biggest communication barriers were poor infrastructure (30.5%) in form of poor transport system, poor power supply, shortage of knowledge and information centers and lack of communication materials (25.8%) that contain all relevant information regarding sericulture and those who had received these materials were in languages such as English which are not known by most of respondents mainly farmers and casual workers. Therefore, there is a need to by government and NGO's such as Tropical Institute of Development Innovations to develop and translate sericulture information materials into native languages that are clearly understood by farmers and all stakeholders. There was 24.5% who had received sericulture related information from research institutions specifically Tropical Institute of Development Innovations, 19.9% information received from extension and field officers and these were mainly recruited by Tropical Institute of Development Innovations under the commercialization of sericulture technologies and Innovations project in Uganda. When respondents were queried on the role of communication in sericulture, 28.5% of respondents noted that they mainly preferred to receive advisory services in form of farm management practices such as acquisition of good quality mulberry materials, planting, pests and disease control but in general all respondents knew the importance and role of communication in sericulture production in Uganda. Source of information on sericulture production, the respondents were asked, "Have you actively received any information on sericulture using social media, extension staff, demonstration farms, research institutions, religious institutions, televisions and radios?" (Question #10). The result showed that social media (9.9%), extension staff (19.9%), demonstration farms (13.9%), research institutions (24.5%), religious institutions (17.9%) and televisions and radios (13.2%)

respectively. The results were in comparison with [11] that access to information is hindered by poor infrastructure, lack of basic services such as electricity in rural setting.

3.3. Different communication methods used in sericulture

Table 3: Different communication methods.

Characteristics	Classification	Frequency	Percent (%)
Communication methods	Face to face events	62	41.1
	Print media	37	24.5
	Audio media	33	21.9
	Video/film media	16	10.6
	Web based information system	2	1.3

The percentage of respondents who preferred and had used different communication methods whereby the highest number of respondents used face to face communication mode (41.1%) mainly through trainings, workshops, conferences and demonstrations organized by different stakeholders to include government and Tropical Institute of Development Innovations (Table 3). It is therefore evident from the results above that face to face communication events were more popularized and used as a mode of communication compared to the rest with web based information systems not even known by all casual workers and farmers, extension officers with only 1.3% of respondents who knew something about these web based information system. However, respondents also showed dissatisfaction and challenges related to face to face communication methods as shown in next section (Table 4) hence the need to popularize and use other methods of communication including print, audio, video and web based information systems. Other studies have also documented that agricultural information requires effective personal communication mainly known as face-to-face communication [12] since it helps to demonstrate knowledge and skills to farmers through both audio and visual aids. [13], also noted that face-to-face communication events were more effective due to the primary channels used which are sound and sight. Farmers who received farm-related information from KVK in India, accessed this information through face-to-face communication due to its demonstrative, trial activities and trainings [14].

Table 4: Cross tabulation of sex, age and geographical location of respondents with communication methods.

		Different communication methods					
Characteristics	Classification	Face to face	Print	Audio	Video	Web based	Significance
Sex of respondents	Male	37	14	15	8	1	0.00*
	Female	25	23	18	8	1	
Age of respondents	19-30	15	14	8	5	1	0.5*
	31-40	27	15	20	7	1	
	41 and above	20	8	5	4	0	
Geographical location of respondents	Eastern Uganda	16	10	5	3	1	0.00*
	Northern Uganda	16	5	7	5	0	
	Central Uganda	14	15	8	3	1	
	Western Uganda	16	7	13	5	0	

*$p<0.05$

Cross tabulation and chi-square test was performed between social demographic characters of respondents (sex, age and geographical location) and different communication methods through which the farmers received sericultural information and the overall results showed sex and geographical location of respondents had a high significant relationship with p-value below 0.05 while age of respondents had a less significant relationship with p-value above 0.05 as shown in Table 4, respondent's knowledge, understanding of communication and different communication methods namely: face to face events, print media, audio media, visual/film media and web based information systems were correlated with their age, sampling location and sex. More number of male respondents had attended sericulture face to face events (37%) compared to females in form of trainings, workshops, conferences and demonstration which was attached to other family attachment and refusal by their husbands. The age bracket of 31-40 years had a better understanding and knowledge of all the communication methods: face to face, print, audio, video and web based with percentages of 27%, 15%, 20%, 7% and 1% respectively with respondents from both central Uganda (41%) and Western Uganda (41%) having a better understanding of communication and communication methods in Uganda compared to Northern (33%) and Eastern Uganda (36%) as shown in table 4. The lack of understanding of the principles, understanding and benefits of communication and communication methods, make the general population more susceptible to negative media reports about sericulture. The chi-square test showed that there was a high significant relationship between sex, geographical location of respondents to different communication methods used with p-value (0.0) below 0.05 while age of respondents had no significant relationship with communication method used with p-value (0.5) above 0.05. Also [15] used cross tabulation and chi-square test to show that there was no significant difference between gender and perception of effective communication channel while other socio-economic factors had a high significant relationship on perception of effective communication with a p-value below 0.05.

3.4. Strengths and weaknesses of different communication methods

Table 5: Face to face communication events.

Characteristics	Classification	Frequency	Percent (%)
Types of face to face media	Conferences	15	9.9
	Workshops	13	8.6
	Field days	24	15.9
	Agric shows and markets	22	14.6
	Extension activities	47	31.1
	Training and demonstration activities	29	19.2
Strengths of face to face media	Interactive	41	27.2
	Encourage collaboration	45	29.8
	More direct impact	39	25.8
	Distribution of printed and other communication materials	25	16.6
Weaknesses of face to face media	Higher costs	40	26.5
	Difficult to organize	33	21.9
	Time bound	36	23.8
	Lower outreach	33	21.9
	One-time events	8	5.3

At least most of the respondents, had used one of the face to face communication types to include conferences, workshops, field days, agriculture shows and markets, extension activities, training and demonstration activities. The results showed that extension activities (31.1%) and training and demonstration activities (19.2%) more often used as face to face communication methods compared to others. Strengths and weaknesses of face to face communication events, respondents were asked in Question #18 addressed the following, "Which of the following strengths does face to face media and options included: interactive, encourage collaboration, more direct impact and easy distribution of communication materials whereby all respondents accepted that face to face communication had the above advantages with collaboration taking a highest percentage of 29.8%. The study identified the following weaknesses as revealed by respondents: higher costs, difficult to organize, time bound, lower outreach and being one-time events as shown in table 4 above.

Different studies have documented advantages of face to face communication: Interpersonal attitudes are easily identical [16], communicator understands whether the information is well understood and delivered [17], people easily interpret, store and retrieve information depending on the associations and meanings of the objects, phenomena and events they have experienced [18]. Challenges of effective communication: lack of important skills in dissemination and training farmers, lack of proper communication techniques [19], extension work is a challenge due to the weak link between research and extension [20].

Table 6: Print media.

Characteristics	Classification	Frequency	Percent (%)
Print media	Policy briefs	12	7.9
	Leaflets brochures	39	25.8
	Reports	19	12.6
	Books	13	8.6
	Scientific journal	13	8.6
	Farming press	14	9.3
	National newspaper	11	7.3
	Local newspapers	29	19.2
Strengths of print media	Lower costs	61	40.4
	Wider outreach	45	29.8
	Permanent	44	29.1
Weaknesses of print media	Not interactive	80	53.0
	Less direct impact	70	46.4

Use of print media as a communication method, the respondents were asked, "Do you use print media? Which kind of print media do you use as source of information? What are the strengths and weaknesses of print media you use? (Question #23). The result showed that 38.7% chose "yes", compared 36.2% who chose "No, but they know about it", and lastly, 25.2% who chose "No, they don't know or use print media". The respondents were using different types of print media to include: policy beliefs, brochures, reports, books, scientific journals,

farming press, national and local newspapers but leaflet brochures with a 25.8% were highly used compared to others due to the fact that these were freely given out to respondents by Tropical Institute of Development Innovations. The respondents also raised a concern that use of print media was dependent on the literacy level and location of respondents whereby it mainly favored those who could read and write and easy accessibility to the printed information materials. Respondents raised the following strengths of print media: lower costs but this was a case for free materials like brochures while national and local newspapers looked expensive and difficult to access, wider outreach and permanent nature of print media. Weaknesses included: non-interactive nature of print media as well as causing less direct impact to the users and consumers. Also the nature of respondents who did not have the culture of reading hence limiting applicability of print media in sericulture production. Other studies have shown that print media is bought and consumed at the farmers' convenience, permanent medium since messages are permanent with high storage, farmers easily receive expertize advices through print media to cope with the emerging challenges through mail to editors or contributors as they avail their information in the magazine [12].

Table 7: Audio media.

Characteristics	Classification	Frequency	Percent (%)
Audio media	Radio	135	89.4
	CD-rom	13	8.6
	Internet audio streams	2	1.3
Strengths of audio media	Low costs	74	49.0
	Wider outreach	54	35.8
	Permanent	22	14.6
Weaknesses of audio media	Not interactive	61	40.4
	High technology requirement	58	38.4
	Less direct impact	31	20.5

This survey revealed that most of the respondents owned a radio (89.4%) which they used as a source of information at their homes and farms compared to other audio sources. This was attributed to easy accessibility of radios, low cost of purchasing and maintaining radios since they don't need high energy consumption like solar and hydro-electricity power, the multipurpose nature of electrical gadgets like phones which in turn served as radios at the same time but most respondents had not fully understood and used other audio means like CD-rom and internet audio streams (Table 6). Findings showed that audio means aren't the most effective ways to learn new skills like planting, disease control since they aren't interactive and had less direct impact but only good at delivering information regarding sericulture production to include market information, weather forecast thus most respondents preferred trainings and demonstrations (face to face communication events). Different researchers have indicated that radios and televisions as a means of communication are conventional, accessible reaches the largest audience, play very important role in dissemination the information about agriculture but purchasing and maintenance of these media source is the biggest challenge in most developing countries [21, 22, 23] also noted that radio as a mode of communication is most used compared to the mobile phone, television, newspapers and the internet respectively. Radio is effective due to availability of many vernacular radios hence easy communication to the targeted groups.

Table 8: Visual media.

Characteristics	Classification	Frequency	Percent (%)
Visual/film media	Television	60	39.7
	DVD	7	4.6
	Internet video streams	2	1.3
Strengths of visual/film media	wider outreach	54	35.8
	Permanent	15	9.9
Weaknesses of visual/film media	High initial costs	49	32.5
	Not interactive	20	13.2

Visual medial communication method, when respondents were asked 'question 26' "Which types of visual communication methods do you use?" Respondents were using televisions (39.7%) more often compared to other types to include DVD (4.6%) and Internet video streams (1.3%) but this was positively correlated to geographical location of respondents whereby those in urban settings used more of the visual media and availability of power in the area where those who had access to hydro-electricity power and solar energy owned and watched televisions. The video/film media reached out to a wider coverage and if recorded was permanent but respondents showed a major concern of high initial costs to maintain them like exorbitant electricity prices/bills, high cost of televisions and solar energy panels. When asked about understanding, strengths and weaknesses of web based information systems (question #25), findings indicated that respondents did not know a thing about web based information systems therefore a need to teach all sericulture stakeholders about this information source.

Different researchers have indicated that radios and televisions as a means of communication are conventional, accessible reaches the largest audience, play very important role in dissemination the information about agriculture but purchasing and maintenance of these media source is the biggest challenge in most developing countries [21, 22]. Televisions easily and simply deliver educational programs including health, education and agriculture development [24].

4. Discussion

Agricultural sector with sericulture part of it, is considered as the spine of the world's economy by serving as means of revenue to approximately 50% of the world's population [25]. Agricultural communication mainly deals with the planning and management of agricultural information and methods aimed at effectively disseminating agricultural technologies and innovations in order to effect desired behaviour changes amongst farmers and community to improve production and productivity [11].

Agricultural information is a key component in improving agricultural production. The importance of knowledge and information sharing in research for development settings has been firmly established through research. Access to appropriate information and knowledge is known to be one of the biggest determinants of agricultural production [26]. During focus group discussions, farmers said that getting information through mobile advisory on day-to-day updates and tips for diseases would be more useful and the schedule data showed that most of the respondents wanted information on new diseases and only a few of the farmers wanted

information on research findings and weather updates.

4.1. Selection and identification of cheap and common communication methods

During this study, it was further revealed that mobile phone was effectively used as a mode of communication between strategic sericulture supervisors situated at the headquarter offices of Tropical Institute of Development Innovations with their subordinates including district sericulture station supervisors and field officers. The field officers did mention that they received information to include: mulberry management practices such as planting, weeding, pests and diseases control but most importantly the accounts department made payments via mobile money payments and this enhanced timely payments and execution of field activities. Mobile phone is one of the best emerging Information and Communication Technology tool [27] which has transformed the manner in which business is transacted, agricultural producers accessed market information through mobile phone in form of SMS [28], Mobile communication guarantees increased access to relevant information, connectedness between people [29].

4.2. Strengthen communication and infrastructure to the public

Respondents who participated in the study noted that different training programmes, demonstrations and trials organized at different research stations by Tropical Institute of Development Innovations had used the sericulture techniques and technologies trained. This was evident that most of the farmers and field officers received all relevant information through face-to-face interaction hence increased knowledge and skills dissemination to all stakeholders. But respondents clearly stated that poor infrastructure like poor road and communication network as this limited reach out by extension and field officers, also limited the radios and television channels these respondents mainly in remote areas could listen and watch in order to access information. Respondents who had televisions noted that paying monthly subscription for televisions had limited the use of that communication channel therefore advocating for use of free to air digital channels which could easily be accessed by resource constrained farmers. [30], also quantified and indicated that face-to face communication and mobile advisory played a big role in disseminating knowledge to farmers thus increasing farm production and productivity. Remunerative markets improved agricultural production, food security and rural livelihoods for small scale farmers as well as national economies [26].

4.3. Link farmers to research through effective communication

Most of the respondents raised a concern of a bigger knowledge gap between farmers (industry) and research institutions whereby it was realized that most research knowledge generated at research stations by researchers both government and private firms is poor dissemination of the research knowledge due to poor technology transfer by the extension officers and other community change agents. Therefore, respondents requested for more easy and accessible communication channel that can easily link up farmers to research through effective communication thus enhancing adoption of sustainable agricultural techniques. Facilitating extension workers in form of transportation helped to reduce the time and transaction costs encouraging greater interactions and linkages between extension officers and farmers [9, 31].

5. Conclusion

Communication is one of the most essential aspect in regards to proper project management and implementation. The process of communicating relevant and up to date information during project execution seems difficult to master, but much energy and resources should be invested in achieving it. One of the reasons why most projects fail is the failure of team members, employers and employees to disseminate important information to end users on a timely basis which if done better leads to project success. Therefore, great improvement is essential to strengthen service delivery and timely achievement of project goals and targets. It is crucial for project managers to communicate the right information right from the beginning to avoid project failures as a result of gaps in the communication process. Effective communication involves use and selection of the right communication channels that can reach out a good number of consumers as well clearly disseminates the message being communicated.

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