Information Sharing Strategies of Smallholder Farmers for Agricultural Systems in Katsina State

By
Abubakar MAGAJI (CLN)
Department of Library and Information Science,
Umaru Musa Yar'adua University, Katsina Nigeria
+2348062361414 Email: magaji.abubakar@umyu.edu.ng
&
Umar Garba GAMA (PhD)
Department of Library and Information Science,
Bayero University, Kano Nigeria
+2348065534593 Email: ugama006@gmail.com

Abstract
This study identified Smallholder Farmers' (SHF) information sharing strategies used for agricultural system. Two research questions and one hypothesis were developed to guide the study. Cross sectional survey design was adopted in which a total of seven hundred (700) smallholder farmers under registered cooperative associations from three agricultural zones of Katsina state formed the population. A total number of two hundred and eighty (280) respondents were randomly sampled using cluster sampling technique. Data were analyzed using descriptive and inferential statistics in which the null hypothesis was tested using Pearson Product Moment Correlation Coefficient (PPMCC). The analysis revealed that there was positive and strong correlation of about 50% in the variation of the level of information sharing strategies of farmers and types of information shared while the remaining percentage of the variation is being influenced by other factors. The findings show the overall strategies used by the farmers to share information for their farming systems which includes; verbal communications, face-to-face interactions, farm visits, extension workers and phone calls. The findings also revealed that majority of SHFs in Katsina state share different types of information among themselves to solve problems related to their agricultural systems. The study recommends that government should design information sharing strategies with social media platforms to assist farmers with modern communication strategies that can complement the traditional strategies for effective information sharing among small holder farmers.

Keywords: Information Sharing, Agricultural Systems, Smallholder Farmers.

Introduction

Information is very critical and plays a fundamental role in supporting agricultural systems irrespective of the status of farmer. Various researches have been conducted on small scale farming and stressed the importance of information for agricultural developments. Ramberg (2020) stated that it is very common farmers gain information and knowledge from other farmers since the information is

accessible and do not require costly inputs. Therefore farmers need to have and share information for a better result in their farming system.
Information sharing simply refers to communication between two or more partners through a particular medium. It can also be seen as a process in which ideas, knowledge and information are exchanged between individuals. Uzezi (2015) noted that, information sharing is a channel through which information is transferred and exchanged from one person or source to another. So effective information sharing could eradicate ignorance and provide the knowledge required to achieve desired economic gross and development. Information sharing play a critical role to the farmers to identify and solve their problems as well as assisting them to improve their farming activities.

Smallholder farmer is an individual person male or female who can cultivate less than 3 hectors of land, using local farming and defend on rain fed system. Nyoni R. S. et al (2024) stated that, seventy percent of smallholder farmers in Africa depend on rain fed farming systems, making them vulnerable to climate variability and extremes.

Katsina state was created in 1987 and it comprises Katsina and Daura Emirates and it borders Kaduna State to the south, Jigawa and Kano states to the east; Zamfara state to the west and shares an international border with Republic of Niger to the north. It occupies an area of about 24,192 square kilometers, with an estimated population of about 5.8 million people. Katsina is a mono ethnic and monolingual state and the people are generally Hausa/Fulani. The major cash crops produced in the state are millet, guinea corn, groundnut, cotton, maize, beans, rice and wheat. Minerals are also found in the region which includes: Kaolin, asbestos, gold, uranium, nickel, chromites and silica sand. (Katsina State Investor's Handbook: 2016). There are two seasons in the state which includes wet and dry seasons. The wet season starts from the months of June to September and the dry season from October to May. The dry season is usually dominated by the north-east trade wind which is dry and dusty, popularly called the "harmattan". The mean daily temperature ranges between 16 and 40°C while the annual rainfall ranges between 300 and 400 mm in the Sahel, 600 to 800 mm in the Sudan savannah and 900 to 1100 mm in the northern guinea savannah (Gambo: 2017). However, 75% of the populations are involved in subsistent farming and livestock rearing and engaged in markets and small businesses. (Katsina State Investor's Handboo: 2016).

Statement of the Problem

Information plays a dominant role in the life of small holder farmers and is essential for facilitating farming systems. Katsina state government is committed in boosting agricultural farming systems for economic survival and livelihood of common citizens. Ladan (2017) stated that, in many states of the federation, particularly those in the northern part conscious efforts are being made to develop farming as source of food, income and employment generation. Katsina State Agricultural and Rural Development Agency (KTARDA) in collaboration with the state government initiated a new agricultural farming support system with new technologies and

innovations to support small and medium farmers to increase food crop production and boost the states' economy.

But two years after the program has taken up, the agricultural systems was not encouraging and the SHFs could still not produce sufficient foods for the state's consumption despite the existing relevant interventions put in place by Katsina state government as reported in (2016) by Katsina State Agricultural and Rural Development Agency (KTARDA). The researchers want to ascertain whether the small holder farmers could not have effective information strategies or do not have culture of sharing information. for their farming systems Therefore, the aims is to find out the strategies employed and types of information shared by small holder farmers in Katsina state for effective information sharing and maximum productivity in farming systems.

Research Questions

1. What types of information shared by small holder farmers for agricultural systems in Katsina State?
2. What information sharing strategies are used by small holder farmers for agricultural systems in the state under study?
3. What challenges affect information sharing strategies employed by the farmers in the area under study?

Research Hypothesis

Ho 1: There is no significant relationship between the information sharing strategies used and types of information shared by small holder farmers in Katsina state.

Literature Review

Information sharing strategies can be described as communication between two or more partners through a particular medium, or an active, dynamic process in which ideas and information are exchanged. Information sharing strategies can also be described as channels used in transferring and sharing agricultural information among farmers. There is need for good information flow and effective information sharing among farmers for better performance and maximum productivity for their farming activities. Studies were carried out on information sharing from the various locations. Hilary et al (2017) stated that information sharing has been regarded as an effective predictor factor of a value chain's effectiveness and contributes largely to improve relationships between suppliers by facilitating efficient coordination and responsiveness as well as integration of partners' information systems. A trusting relationship encourages interaction among value chain actors and further enhances the benefit of information sharing. The lack of trust in agriculture extension workers resulted into farmers being reluctant in accessing information from them. Information sharing has enabled increased yields, well informed decisions and reduces losses. *Ramberg* (2020) stated that, agricultural extension has traditionally focused on transfer of information and knowledge sharing on agriculture from professional extension workers to farmers. He also added that, smallholder farmers knowledge sharing is taken place in the village learning centres, social events, collaborations, social relations and social network platforms through different forms

of farmer groups. Therefore, this means that small holder farmers shared information through traditional means than to use new technology strategies and it will bring more benefits and opportunities to share many information.

The Type of Information Shared by Smallholder Farmers for Farming Systems

Farmers in Katsina mostly shared information for many purposes of their farming activities, from the research findings it revealed that farmers shared information on problem solving with highest percentage 97.25%, followed by information on new methods of farming with 94.90%. It also revealed that, 92.94% of the farmers shared information for new technology while 90.59% for maximum productivity of farm produce. It could be said that, these are the reasons that push farmers to share information among them and extension workers for farming activities. However, the result revealed that 65.49% of the respondents shared information when government has new policies on agriculture. It is observed that some government new policies are not suitable for SHFs to comply, that was the reasons for not sharing such information. Farmers shared information about farming techniques through extension workers to any threat to the development of the agricultural system in their locality.

Information Sharing Strategies Used by Farmers for Farming System

Information sharing in agriculture refers to a scenario where two or more value chain actors (which could include smallholder farmers) share data amongst themselves under a set of binding principles and agreements, allowing for a reduction in the quantum of data collected and a re-use/recycling of already collected data. By streamlining and reducing duplication of data, information sharing can potentially internalize leakages in resources used to manage agricultural information, the benefits from which can be transferred to smallholder farmers in the form of reduced costs of service delivery, or better designed services. (World Bank 2023). Muhanguzi and Ngubiri (2022) opined that, agricultural information can enhance smallholder farmers' knowledge sharing and decision-making ability. Hence fourth, there is need for small holder farmers to have effective and reliable information sharing strategies. Masuki, et al. (2010) discussed strategies used by farmers in sharing information as follows:

1. Correspondence: This is a non-concurrent but a remote communication strategy between farmers which includes: letters, newsgroups, face-to-face interactions, focus groups and debates.
2. Interpersonal channels: These involve one-on-one conversations with many people within a society that includes extension work, toll free lines, video and audio clips among farmers.
3. Training strategies: Government information units can be used to equip public relation officers and journalists with knowledge and skills for reporting on agricultural issues and awareness
4. Publication: Publication may take the form of brochures, calendar of events, information bulletins like folders, pamphlets, newsletters, and annual reports, among others.

5. Public events: These strategies could be used for educational and awareness purposes to share agricultural information and environmental disaster awareness. Z
6. Socio-Cultural marketing: culture and use of non-traditional forms of media such as traditional dances, drama, community theatre, poetry, song and debates.
7. Media: farmers receive and share information through a variety of communication media which includes; radio, television, mobile phones, village meetings, leaflets among others.

Ndilowe (2013) stated that, interpersonal communication emerged as one of the most effective strategies used when communicating to farmers. Information whether print, electronic or verbal plays a critical role in farming system which needs to be taken into great consideration. This strategy refers to oral or verbal personal communication use for sharing information among farmers. Mabuku (2015) supported that oral communication was the most preferred communication strategy but it was revealed in many researches that farmer's education had an influence on the strategy of communication that farmers with no formal education or those in primary and secondary levels relied heavily on oral (verbal) communication. Moreover, print resources such as pamphlets, posters and magazines on various aspects of agriculture are also used as a means of strategies used by smallholder farmers for information sharing.

Abcic (2016) elaborated information sharing strategies of farmers as a linked with the Information and Communication Technologies (ICT) which includes the use of internet and social network to share information among small holder farmers to support their farming activities. The extension agents cannot reach every farmer, so mass media could be used to share information among small holder farmers from various destinations. This cannot be achieved without assembling all the necessary technologies to handle information and facilitate communication among farmers.

It can be observed that, small holder farmers prefer getting information through oral communication which enable them to clarify issues. For instance, if there is a new technology introduced, it will be difficult for them to accept unless the extension workers demonstrate how a particular technology works, because they are more comfortable with the use of traditional strategy. Based on the knowledge of researchers and empirical studies carried out, it is noted that no study was conducted to investigate the information sharing strategies of SHFs in the study area.

Small holder farmers share information face-to-face through village meetings, market or religious gathering, in the farms or at the family houses, these strategies can be able to solve farmers problems and have their own development process as well as reducing the damages for their farming system. Therefore, information sharing strategies will be an important tool for the policy formulation and implementation for more successful farming systems.

Challenges of Information Sharing Strategies Used by Farmers

Hilary et al. (2017) conducted a study on information quality, sharing and usage in Uganda, and stated that, most farmers were unwilling to share information that may put them at a competitive disadvantage. As a result, tremendous amounts of information remain inaccessible to other value chain actors. The findings shows that SHFs were facing infrastructure shortage (power), lack of money to buy mobile phone, radio and service fee, lack of interest, incompatible format where the information is packed, and maintenance problem. The study of Hilary, et al (2017) further revealed some challenges of information sharing as include:

a. Lack of feedback: Limited feedback from information seekers led to lack of trust. There is a risk of acting against one another's interests rather than working toward common objectives. Positive feedback is very important in information sharing to avoid information distortion.
b. Language Barriers: The study further revealed language barriers was a challenge of information sharing. Handbooks were written in English languages for the farmers to comprehend, this simply highlight the information gaps exist due to language barriers and mind set of some actors.
c. Limited knowledge on use of smart phones: with the aid of high-speed cellular network, any video, audio, or multimedia files can be shared through the use of mobile phones. The study revealed that, there was limited knowledge on the use of smart phones by farmers among others.

Rafaeli, and Raban (2005) identified some problems of information sharing via technology channels of SHFs, it was revealed that, the problem of information sharing may stem from the medium used rather than from the willingness to share. Information sharing also may be affected by a host of additional factors, individual differences and educational background among others.

Aina (2007) stated some problems with sharing and dissemination of agricultural information in Africa thus include; inadequate financial power of farmers in Africa, Illiteracy of African farmers. Majority of them cannot read or write in any language. African farmers live in areas, where there is lack of basic infrastructure, such as telephone, electricity, good road network, few numbers of extension workers, and poor radio and television signals in most communities among others.

Food and Agricultural Organization of the United Nations (FAO) ;(2021) stated that farmers share a lot of valuable information with several other actors in different data value chains, e.g. with technology providers for precision agriculture decision support systems; with suppliers and distributors for data exchange in the supply chain; with farmers' associations for the purpose of registration and service provision; with banks for financial assessment; and with governments for subsidy eligibility and compliance, etc.

Methods

The main objective of the study to investigate information sharing strategies and types of information shared by SHFs in Katsina State and make recommendations to solve the problems associated with farming activities. Cross sectional survey

design was used in this study for estimating the prevalence of farmer's information sharing strategies and information they shared among themselves. Sedgwick (2014) justify that, the cross sectional survey is generally quick, easy, and cheap to perform. However, a cross sectional study was prone to non-response bias if participants who consent to take part in the study differ from those who do not, resulting in a sample that is not representative of the population. The target population of this study is 700 registered farmers, 280 were the sample size, cluster sampling technique was used while descriptive and inferential statistics was also used in data analysis. The researchers used Diffusion of Innovations Theory (DOI) to study strategies used for effective information sharing which can be used to enhance farming systems in the study area.

Results

1. Response Rate

Table.1: Frequency and Percentage of Questionnaires distributed to SHFs

Questionnaire	**Frequency**	**Percentage %**
Administered	280	100
Returned	255	91.1
Not returned	25	8.9

Table 1 shows that 280 copies of questionnaire were distributed from which two hundred and fifty-five (255) representing 91.1 % of the total number of instruments distributed were returned and found useful. This shows high response rate in terms of administration of the instrument for the study which could be attributed to the determination and commitment of both researchers and research assistants in terms of distribution and collation of the instruments as well as the good understanding between researchers and respondents.

2. Demographic Data

Table 2: Demographic Data of the Respondents

SN	**Items**	**Description**	**Number of Respondents**	**Percentage (%) of Respondents**
1	Local Government Area	Kafur	67	26.27
		Kurfi	93	36.47
		Mashi	95	37.25
	Total		**255**	**100 %**
2	Gender	Male	217	85.10
		Female	38	14.90

3	Age	Below 20 years	13	5.10
		21 – 30 years	58	22.75
		31 – 40 years	49	19.22
		41 – 50 years	82	32.16
		51 years and above	53	20.78
	Total		**255**	**100 %**
4	Educational Level (Certificate)	Adult Mass Literacy	11	4.31
		Primary School Leaving certificate	33	12.94
		Secondary Sch. Leaving certificate	65	25.49
		NCE/OND	96	37.65
		Others	50	19.61
	Total		**255**	**100 %**
5	Experience in Farming activities	1 – 5 years	28	10.98
		6 – 10 years	59	23.14
		11 – 20 years	58	22.75
		21 – 30 years	65	25.49
		31 years and above	45	17.65
	Total		**255**	**100 %**

(Source: Field Data, 2018)

Table 2 demonstrates a demographic data of SHFs in the area of study. Concerning the gender, most of the SHFs are males (85.1%), with insignificant percentage of female farmers. In terms of the respondent's age group, the result indicates wide differences with 5.10% of the respondents below 20 years of age. It revealed that majority of farmers fall within the range of forty-one to fifty years and the subsequent ages as indicated above. With respect to the respondents' educational level, the study demonstrates that 37.7% of the respondents possessed the Nigeria Certificate in Education (NCE) and the National Diploma (ND) while 25.5% were Secondary School Certificate holders. The least privilege which was 12.9%, were Primary School Leaving Certificate holders; 4.31%, were holders of Adult Mass Literacy Certificate and 19.6%, were holders of other certificates. With regards to farming experience, the result revealed significant percentages of farming experiences across the levels of all ages. It revealed that 25.49 % and 23.14 % are within the ages of 21 to 30 years and 6 to 10 years respectively. 22.75 % were within the ages of 11 to 20 years, and 17.65 % were within the ages of 31 years and above, only 10.98 % falls within the range of 1 to 5 years of experience in farming activities.

RQ 1. Information Sharing strategies employed by Small Holder Farmers

Table 3: information Sharing Strategies Used by SHFs

SN	Strategies	Agree		Disagree	
		Frequency	Percentage (%)	Disagree Frequency	Percentage (%)
1	Face to face interaction	233	91.37	22	8.63
2	Extension workers	240	94.12	15	5.88
3	Oral/verbal communications	245	96.08	10	3.92
4	Phone calls	182	71.37	73	28.63
5	Farm visits	230	90.20	25	9.80
6	Town criers	185	72.55	70	27.45
7	Social medias	210	82.35	45	17.65

(Source: Field Data, 2018).

Table 3 shows that the information sharing strategies used by SHFs in Katsina state are very common. The highest of the strategies as agreed by the farmers is oral/verbal communications with 96.08% followed by extension workers with 94.12%. It also revealed that 91.37% and 90.20% used face to face interaction and farm visits to share information respectively. Significant percentages also indicated that 82.35% and 72.55% used social media and town criers respectively. These could be also attributed to the farmers' experiences and background knowledge in farming activities as well as less stress to their satisfactions. However, the data revealed that, phone call being the least but with significant percentage of 71.37% while 28.63% disagreed in using phone calls as strategies for information sharing. This could be attributed as the result of cost of phones and money to buy airtime credits.

RQ 2. Types of Information Shared by Smallholder Farmer in Katsina State

Table 4 Information Shared by Farmers

SN	Information shared	Agree		Disagree	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1	New methods of farming information	242	94.90	13	5.10
2	Problem solving information	248	97.25	7	2.75

3	New technology of farming	237	92.94	18	7.06
4	Maximum productivity of farm produce	231	90.59	24	9.41
5	Government new policies on agriculture	167	65.49	88	34.51

(Source: Field Data, 2018)

Table 4 shows that farmers mostly shared information for many purposes of their farming activities. Information shared on problem solving has the highest percentage 97.25%, followed by information on new methods of farming with 94.90%. It also revealed that, 92.94% of the farmers shared information for new technology while 90.59% for maximum productivity of farm produce. It could be said that, these are the reasons that push farmers to share information among them and extension workers for farming activities. However, the result revealed that 65.49% of the respondents shared information when government has new policies on agriculture, but 34.51% disagreed.

RQ 3 Challenges Affecting Information Sharing Strategies Employed by SHFs

Table 5: Challenges of Information Sharing

SN	Challenges	Frequency	Percentage (%)
1	Lack of transportation services in the rural areas	211	82.75
2	Poor knowledge sharing culture of small holder farmers	194	76.08
3	Lack of public libraries and information centers in the rural areas	208	81.57
4	Lack of technical knowledge on how to use ICT	242	94.90
5	Uncovered age network services in rural areas	217	85.10
6	High cost of smart phones and data for network plan by farmers	224	87.84
7	Lack of understanding and political conflict in rural areas	208	81.57

(Source: Field Data, 2018).

Table 5 indicated that lack of technical knowledge on how to use ICT with 94.90% was the challenge that had the highest percentage. High cost of smart phones and data for network plan had 87.84%. The result also revealed that uncovered age network services and lack of transportation services in the rural areas had 85.10% and 82.75% respectively. However, it revealed that lack of public libraries and information centers as well as lack of understanding and political conflict in rural areas had 81.57%. Poor culture of SHFs with 76.08% was the challenge that had the least percentage.

Null Hypothesis of the Study

$H0_1$ There is no significant relationship between the information sharing strategies used and types of information shared by small holder farmers in Katsina state.

Table 6: Summary of the Relationship between Information Sharing Strategies and Agricultural Systems

	Mean	Std. Deviation	N
Information Sharing Strategy	29.502	3.8790	255
Types of Information Shared	8.749	1.4499	255

The results in table 6 present the summaries of the descriptive statistics of the relationship between the information sharing strategies and types of information shared by SHFs in Katsina state. A total of 255 samples were computed. They revealed a mean score of the farmers' information sharing strategies as 29.502 while the mean score of types of information shared as 8.749. This analysis shows that there is a significant difference between the means of the variables.

Table 6: Correlations between Information Sharing Strategies and Agricultural Systems

		Information Sharing Strategies	Types of Information Shared
Information Sharing Strategies	Pearson Correlation	1	.480**
	Sig. (2-tailed)		.000
	N	255	255
Types of Information Shared	Pearson Correlation	.480**	1
	Sig. (2-tailed)	.000	
	N	255	255

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6 represents the Pearson's Product Moment Correlation (PPMC) of the hypothesis of the study on the level of information sharing strategies and types of information shared by the farmers in Katsina state. The analysis revealed that the relationship is positive with a strong correlation between the variables; about 50% in the variation of the level of information sharing strategies of farmers is explained by the variation in types of information shared by SHFs while the remaining percentage of the variation is being influenced by other factors in the study area. The correlation is (r (253) = .480, n=255, p=.000, i.e. less than 0.05).

Accepting or Rejecting the Null Hypothesis Two ($H0_2$) of the Study

If the P value significant level is less than 0.05 ($p < .05$) the Null Hypothesis of the study will be rejected, while if the P value significant level is greater than 0.05 ($p > .05$) the Null Hypothesis of the study will be retained. Therefore, according to this analysis, the Null Hypothesis is rejected ($p < 0.05$ i.e. Sig = 0.000), because there is sufficient evidence of significant correlation (r (253) = .480, n=255, p=.000, i.e. less than 0.05) between the level of Information Sharing Strategies and extent of types of information shared. That is, there is a statistically significant relationship between the information sharing strategies used and types of information shared by SHFs. The variations in the mean of the dependent variable (types of information shared) is not happening by chance but as the result of the influences of information sharing strategies adopted by the SHFs in the study area..

Discussion

The study shows that farmers prefer traditional method of getting information through verbal communication strategies which brings more benefits, though at the present time, there is Information Communication Technology (ICT) and social networks that can be used to share information such as use of face book, WhatsApp and mobile phones to make calls or send messages which could have increased the effectiveness of information sharing strategies and gave assurance for effective and efficient communication that need farmers also to use and adopt. This corroborates with the statement of Hilary et al. (2017) that information sharing has been regarded as an effective predictor factor of a value chain's effectiveness and contributes largely to improve relationships between suppliers by facilitating efficient coordination and responsiveness as well as integration of partners' information systems. But contrary to the findings of Abbas (2015), which reported that farmers in Nigeria share and disseminate information via mobile telephones.

Though there was insignificant empirical findings on the types of information shared by famers to the best knowledge of researchers but this study revealed that farmers mostly shared information for many purposes of their farming activities that include; information for problem solving, new methods and technology of farming as well as information when .government has new policies on agriculture. The findings of this study corroborates with the findings of Mabuku (2015) which revealed that farmers preferred information sharing through oral communication strategies that includes; face to face interaction, extension workers, pamphlets, and agricultural dealers which corroborate with the findings of Masuki et al (2010). Thus brings more benefits to them than mass media, print media, ICT media and

interpersonal communication media. But there are some challenges on how small holder farmers use smart phones, unreliable network connectivity and high costs of air time credit

Conclusion

The strategies used by farmers to share information include; face to face interactions, market and religious places, village meetings, among others, with less emphasis on radio, television, mobile phones and ICTs gadgets which are the major modern systems for information sharing. Sharing information in modern or traditional methods both plays a dominant role by assisting SHFs to use new innovative technologies for agricultural systems. Therefore, one promising information strategy that could be employed to share information by SHFs at this present time is a modern method through Information Communication Technologies (ICTs).

Recommendations

1. Government should provide all the necessary support to extension workers and adopt new strategies by using social media platforms to increase effective information sharing for enhancing agricultural systems in Katsina state.
2. Government should provide smart phones to registered farmers through their cooperative associations and network providers should also upgrade their systems with efficient internet connectivity and make subsidy for data subscription to smallholder farmers.
3. Extension workers should create online and social media platforms and train small holder farmers through workshops and market displays on how to use smart phones for information dissemination and sharing.

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