Understanding Communication Behaviour of Farmers and Barriers to their E-readiness

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Abstract

Information and Communication Technology has the capability to revolutionize the agricultural sector by providing valuable digital information. In present study 225 farmers from five districts of Punjab were randomly selected to investigate their communication behaviour and barriers that hinder E-readiness of farmers. Among all the information sources availed by the farmers, extension activities was most preferred for information seeking while personal interaction was the most popular method of sharing farm information with fellow farmers. Majority of the farmers memorised the information and shared it through personal face to face interaction with other farmers. Study also revealed that majority of farmers (57.78%) exhibited passive communication behaviour. Technological factors such as inadequate computer facilities and power failure were the main limitations in the use of ICT. Personal factors such as lack of time and security concerns were also found as major inhibitors. The study suggested that functional area should initiate campaign to enhance the accessibility of ICTs to farmers' extension activities in rural areas. Extension organizations can adopt strategies to provide relevant content preferably in the local language and intensify the capacity building of farmers. The results of the study will be of immense use to relevant organizations, policy makers and change agents involved in implementing ICT programmes.

Keywords: Agricultural extension, Communication behaviour, E-Readiness, ICT, Problems, Market, Factors.

JEL classification: Q1, Q16, D83, L11

Introduction

Particularly in rural areas, agriculture provides opportunity and jobs in addition to being a source of food. Therefore, it is imperative to give agriculture's growth and development a high priority, particularly in developing nations (Khan *et al*, 2020). Agriculture has evolved over time to become the predominant occupation of the farming community in India. The complexity of agricultural problems like the lack of qualified labour, and the shifting nature of farmer needs have led to emergence of technological options in the field of agricultural extension to to act as a connecting link between the knowledge generators and farming community (Röling and Pretty, 2023). The primary tool for increasing agricultural production and fulfilling strategic objectives for effective agricultural extension is technology (Mustapha *et al*, 2021). The primary goal of agricultural extension is to provide adequate and valuable knowledge to end-users for reassuring them to follow what would ultimately result to the growth of agricultural production (Hassan *et al*, 2019; Ramli *et al*, 2019).

Technology refers to the application of digital information to meet consumer demands for certain outcomes, goods, and services. Technology is the creation, modification or alteration of the natural environment to satisfy human needs and desires (Ekwujuru, 2006; Umar *et al*, 2019; Man and Isah, 2019). The use of advanced information and communication technologies for agricultural extension are increasing and becoming more and more important for agricultural productivity and growth. ICT use in agriculture offers a more effective and economical means of expanding information sharing. ICT have the potential to improve extension programme by improving collective learning, sharing time-sensitive information about market prices and disease outbreaks, involving farmers in determining their own needs, encouraging various stakeholders to brainstorm,

develop various innovative technologies and promoting agriculture business (Mustapha *et al*, 2021).

Extension and rural advisory services are likely to be more dependent on ICTs as a result of the development of communication technologies, since they will be able to transmit agro-based sophisticated technologies to the end users in most effective, appropriate, and creative ways. Additionally, extension and consulting services based on ICT are essential in providing farmers with agricultural information and knowledge. The application of information and communication technology in the recent past could be witnessed in almost all the sectors with no exception to agriculture (Naik, 2014). The application of ICTs in agriculture is expanding steadily in today's world. Any country's use of ICT depends on a variety of elements, including infrastructure, governmental policy, cultural considerations, and human resources (Purnomo and Lee, 2010). The "Global Digital Divide," which refers to considerable geographical differences in ICT use, is of great concern to policymakers around the world. So, in this study, an effort has been made to investigate the reasons that prevent farmers from using ICT. Understanding the issues and attitudes of the farmers towards using ICT can be accomplished by identifying these aspects. The findings can be used as a guide to ensure that agricultural advisories are effectively distributed using ICT-based extension services.

Data Sources and Methodology

The study is based on primary data collected from farm households in Punjab, India. The state is divided into five agro climatic zones i.e. sub-mountain undulating zone, undulating plain zone, central plain zone, western plain zone, and western zone. Five districts from each agro-climatic zone *viz.* Ludhiana, Gurdaspur, Ropar, Ferozpur and Bathinda was randomly selected. One block was selected from each selected district. Three villages from each block were selected making a total sample of 15 villages. Out of the selected 15 villages, 15 farmers from each village were selected, making a total sample of 225 farmers. Communication behaviour of farmers was operationalized as the frequency of use for various channels utilized by farmers for seeking, processing and disseminating information. A list of all the possible channels of communication was prepared after a thorough review of the literature and pilot survey. It was studied in terms of information seeking behaviour, information processing behaviour and information dissemination behaviour. For examining the communication behaviour of the respondents, three response categories *viz.* 'passive ', 'active', and 'ongoing' were developed and modified for the present study as per model of information seeking behaviour given by Wilson in 1997 (Singh and Swain, 2016).

Lastly, the barriers in e-readiness were operationally defined as bottlenecks perceived by the farmers that obstruct their access and use of ICT such as personal, technological, infrastructural, economic, and cultural barriers.

Results and Discussion

Results are expressed in terms of socio-personal characteristics and the communication behaviour of various ICT which are presented in terms of information seeking, processing and dissemination behaviour. Further, the prominent factors that affect the communication behaviour of farmers with regard to the usage of ICT were also identified.

Socio-personal Characteristics of Farmers

Results presented in Table 1 provide information regarding the socio-personal characteristics of farmers. It revealed that majority of the farmers (60.44%) were less than 39 years, 26.67 per cent fell in the age group of 39-58 and 12.89 per cent are more than 58 years. With respect to marital status, a majority of the farmers (96.89%) were married and only 3.11 per cent of them were unmarried. Information regarding family type of farmers elucidates that more than half of the respondents (66.67%) belonged to nuclear family while 33.33 per cent belonged to joint family. It was inferred that majority of the respondents (68.00%) had family size of less than 4, whereas 19.11 per cent had a family size of 4 to 6 and only 12.88 per cent had family size of more than 8 members. The education level of farmers is also observed which revealed that near about (45.33%) were educated up to matriculation level and 37.78 per cent were educated up to the intermediate level. It was also evident that 12.00 per cent of the farmers were educated up to primary level followed by 3.11 per cent educated up to the graduate level. Surprisingly only four of the farmers (1.78%) were illiterate. Farming experience showed that most of the farmers (40.44%) had farming experience between 19 to 35 years and 36.00 per cent had farming experience of more than 51 years followed by 23.56 per cent of them had farming experience of less than 19 years.

The operational land holding size of the farmers' revealed that most of the farmers (44.00%) were of semi-medium category and possessed operational land holding of 5 to 10 acres, whereas 25.33 per cent had small land holding of 2.5 to 5 acre. Further, 22.66 per cent of respondents had medium land holding of 10 to 25 acre and 5.77 per cent had marginal land holding of less than 2.5 acre while only 2.22 per cent of the farmers possessed large operational land holding of more than 25 acres. According to results indicated in table a huge majority of farmers (77.33%) had low annual income between 1 to 3 lakh; followed 21.42 per cent of the farmers who had an annual income between 4-6 lakh. Only three respondents (1.33%) had annual income of more than 6 lakh. With regards to training received by farmers on ICT, it was found to be only six farmers (2.66%) that had confirmed to receive training on ICTs. The reason might be lack of awareness in farmers about use of latest technologies in agriculture or lack of skill enhancement training centres

Table 1. Socio-personal characteristics of farmers

S.No.	Profile	Categories	No.
1.	Age (years)	20-39	60(26.67)
		39-58	136(60.44)
		58-77	29(12.89)
3.	Marital status	Unmarried	7(3.11)
		Married	218(96.89)
4.	Family type	Nuclear	150(66.67)
		Joint	75(33.33)
5.	Family size (members)	2-4	153(68.00)
		4-6	43(19.11)
		6-8	29(12.88)
6.	Education	Illiterate	4(1.78)
		Primary education	27(12.00)
		Matriculation	102(45.33)
		10+2	85(37.78)
		Graduation	7(3.11)
7.	Farming Experience (Years)	3-19	53(23.56)
		19-35	91(40.44)
		35-51	81(36.00)
8.	Operational land holding (acres)	Marginal (<2.5 acre)	13(5.77)
		Small(2.5-5 acre)	57(25.33)
		Semi-medium(5-10acre)	99(44.00)
		Medium (10-25 acre)	51(22.66)
		Large (>25 acre)	5(2.22)
9.	Annual income from agriculture (rupees)	Low (1.00-3.73)	174(77.33)
		Medium (3.73-6.46)	48(21.33)
		High (6.46-9.19)	3(1.33)
10.	Occupation	Agriculture	225(100.00)
		Dairy	7(3.11)
		Service	3(1.33)
11.	Training received on ICTs	Yes	6(2.66)
		No	219(97.33)

Figure in parenthesis indicates percentage

for ICT. The findings were in line with Naik *et al* 2021 and Gopal *et al* (2018).

Communication behaviour of farmers

Details regarding the communication behaviour of the farmers have been presented in this section which summarized the style of communication expressed in terms of information-seeking behaviour, information processing behavior and information dissemination behaviour based on experience generated from various ICT and its features.

Information-seeking Behaviour of Farmers

Information-seeking behaviour of farmers through Information and Communication Behaviour (ICT) was measured on four different dimensions *viz*. online resources, print media, extension activities, and interpersonal sources. Considering the online source of information, browsing websites had a mean score of 1.64, where considerable

number (52.88%) of the respondents browsed website occasionally followed by 5.33 per cent of them were browsing website regularly. Next commonly accessed information source was found to be watching online video with mean score of 1.56. It was observed that a few of the farmers (6.66%) were regularly watching online videos followed by 42.66 percent of them who watched online video occasionally. Mobile apps were least used by the farmers with the lowest mean score of 1.24. It was observed that only 6.66 per cent of them were regularly using mobile apps and 11.11 per cent of them were occasionally using mobile apps for seeking agricultural information.

It was evident that print media was not much popular information source by the farmers. Extension publications had mean score of 1.59, and 13.33 percent of them were regularly reading extension publications while 32.44 per cent of them were occasionally reading extension publications. Surprisingly only 2.22 per cent of them read books regularly and 4.00 per cent of them were occasionally reading books with a mean score of 1.08. Results about seeking information from extension activities by farmers revealed that the majority of the respondents (67.55%) were regularly attending Kisanmela, 21.77 per cent of them were occasionally attending kisanmela with a mean score of 2.57. The second most sought information source was trainings with mean score of 1.93. Most of them (43.11%) were occasionally acquiring trainings while 24.88 percent of them were regularly acquiring information from trainings. Participation in demonstrations was another important source of information with mean score of 1.59, where majority of the respondents (42.66%) occasionally take part in demonstration and only 8.00 per cent of them were regularly taking part in demonstrations. The least mean score of 1.27 was for visiting exhibitions. About (18.22%) of the farmers occasionally visited exhibitions and very few 4.44 per cent of them were regular in visiting exhibitions.

Interpersonal sources were more available and accessible to farmers as illustrated by data that interaction with progressive farmers served as a highly preferred information source to majority of the respondents (52.44%) who interacted regularly followed by 32.00 per cent of them who interacted occasionally with progressive farmers with a mean score of 2.37. Interaction with ADO had mean score of 1.72 where 25.33 per cent of the respondents regularly interacted and 20.88 per cent occasionally interacted with ADO. PAU kisaan club and village Sarpanch scored same mean value of 1.68. About 20.00 per cent of the farmers regularly attended PAU kisaan club meetings followed by 26.66 per cent of them who occasionally attended meetings while 15.11 percent of the farmers communicated with village Sarpanch regularly followed by 38.22 per cent of them communicated occasionally. It can also be found that interaction with KVK scientist was only done by 10.66 per

cent of the farmers in a regular mode followed by 30.66 per cent who were occasionally interacting with KVK scientist, it had a mean score of 1.52. Further private agencies and interaction with university scientists scored the lowest with mean score of 1.32 and 1.25 respectively. Nearly 19.11per cent of the farmers occasionally contacted private agencies and a few 5.78 per cent of them regularly contacted with private agencies. It was evident that only 9.77 per cent of the farmers were communicating occasionally with university scientists while 7.55 percent of them were in regular touch with the university scientists.

It is evident from the above findings and discussion that face-to-face interaction is still found to be a preferred source of information by the farmers of Punjab while use of online sources has the potential to affect the information searching behaviour of farmers. Most of the respondents admitted that interpersonal channels were generally found to be more available, accessible and used by farmers to obtain information and extension activities could play a paramount role in providing practical information to them which will lead to optimistic changes in their way of learning from information seeking. Intervention of devices such as smart phones along with interpersonal source and extension activities may prove cost-effective and provide tailor-made, instant, need-based and unbiased information. The findings confirmed with the findings of Sanga *et al* (2018), Mahindarathne *et al* (2019), Rahman *et al* (2020), and Shukla *et al* (2021).

Mean Score of Information Sources Availed by Farmers

For farmers highest overall mean score (1.84) was for extension activities and lowest score observed was 1.33 for print media. While figure no. 1 also depicts that interpersonal channels have an overall mean score of 1.70 while online resources have an overall mean score of 1.50. The probable reason behind the findings is that most of the time farmers are in their fields and meeting people in person throughout the day. It could be because of preferring interpersonal sources such as fellow farmers and extension personnel for seeking information. Also surfing information over online resources and downloading it into device for future reference may be time consuming for them as most of the time they are undertaking farming operations. Farmers above the age of 50 years do not prefer the internet as the major source of agriculture information. This is because they were not exposed to computers and internet while they were in school unlike the younger farmers. The above findings clearly indicated that farmers are interested in extension activities and interpersonal channels to gather information as information from extension activities is practical and reliable. The reason for the least preference of print media could be the less agricultural publications which is not enough to cater needs of farmers. The findings are in line with Khan *et al* (2020).

Table 2. Information-seeking behaviour of farmers   **(n=120)**

Information sources	Regularly	Occasionally	Never	Mean score
	No.	No.	No.	
Online resources				
Online videos	15 (6.66)	96 (42.66)	114 (50.66)	1.56
Websites	12 (5.33)	119 (52.88)	94 (41.77)	1.64
Mobile-apps	15 (6.66)	25 (11.11)	185 (82.22)	1.24
Print media				
Agri. Books	5 (2.22)	9 (4.00)	211 (93.77)	1.08
Agricultural Magazines	30 (13.33)	73 (32.44)	122 (54.22)	1.59
Extension activities				
Kisan mela	152 (67.55)	49 (21.77)	24 (10.67)	2.57
Trainings	56 (24.88)	97 (43.11)	72 (32.00)	1.93
Exhibitions	10 (4.44)	41 (18.22)	174 (77.33)	1.27
Demonstrations	18 (8.00)	96 (42.66)	111 (49.33)	1.59
Interpersonal				
University scientist	17 (7.55)	22 (9.77)	186 (82.66)	1.25
KVK scientist	24 (10.66)	69 (30.66)	132 (58.66)	1.52
Village Sarpanch	34 (15.11)	86 (38.22)	105 (46.66)	1.68
ADO	57 (25.33)	47 (20.88)	121 (53.77)	1.72
PAU Kisan club	45 (20.00)	60 (26.66)	120 (53.33)	1.67
Interaction with progressive farmers	118 (52.44)	72 (32.00)	35 (15.55)	2.37
Private agencies	13 (5.78)	43 (19.11)	169 (75.11)	1.31

Figure in parenthesis indicates percentage
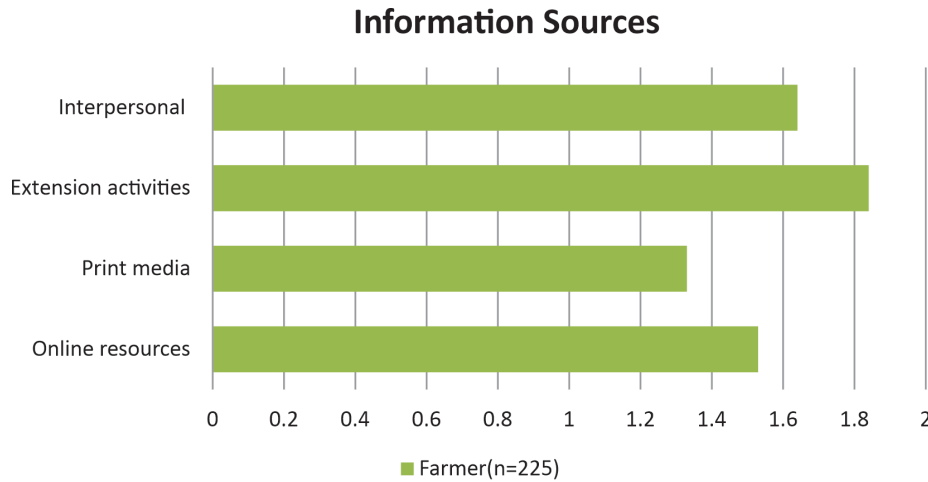
Information Sources

Figure 1: Overall mean score of information sources availed by the respondents

Information Processing Behaviour

Data about information processing behaviour indicated that method of memorizing the information observed highest mean score of 2.43 and retrieving information through making notes in diary has a mean score of 1.17. Method of keeping a leaflet had a mean score of 1.96 while keeping newspaper clipping observed a mean score of 1.33. Processing information through smart phone had a mean score of 2.07. Methods like capturing photos/video had a mean score of 1.71 and the findings showed a similar trend with Gopal *et al* (2018).

Information Dissemination Behaviour of Farmers

Data described that personal interaction with fellow farmers was the most popular method of sharing farm information with a mean score of 1.93 and near about 35.55 per cent of the respondents were regularly interacting with farmers and 21.77 per cent of them were occasionally interacting with the farmers for sharing information. Phone call had a mean score of 1.53 and was used regularly by only

8.89 percent of them and about 35.55 per cent were using it occasionally for disseminating farm information. WhatsApp call had a mean score of 1.51 and was used regularly by only 7.11 per cent of farmers and about 36.88 per cent of them used it occasionally to share information. The least used method of information dissemination was group discussion with mean score of 1.44 and only 14.22 per cent of the farmers regularly used group discussions to share information followed by 15.11 per cent of them were occasionally used group discussions method. It might due to the reason that farmers are more inclined towards traditional methods i.e. face to face interaction and having communication with each other over phone call. The findings are to be in contrary to Naik (2014).

Communication Behaviour of Farmers

Overall communication behaviour of farmers revealed that a major number of 57.78 per cent farmers had passive communication behaviour followed by 31.56 per cent active and only 10.67 per cent of them had ongoing communication
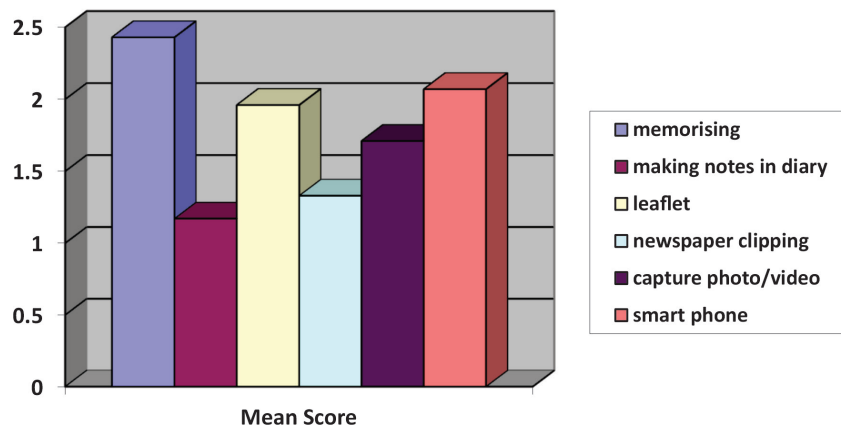

Figure 2: Overall mean score of information processing methods used by farmers Information dissemination behaviour

Table 3: Information dissemination behaviour of farmers

Information dissemination methods	Regularly	Occasionally	Never	Mean score
	No. (%)	No. (%)	No. (%)	
Personal interaction	80 (35.55)	49 (21.77)	96 (42.66)	1.93
Phone call	20 (8.89)	80 (35.55)	125 (55.55)	1.53
WhatsApp video/voice call	16 (7.11)	83 (36.88)	126 (56.00)	1.51
Group discussions	32 (14.22)	34 (15.11)	159 (70.67)	1.44

Figure in parenthesis indicates percentage

behaviour; it observed a mean of 50 (Table 4). The probable reason is that many of the farmers are using less ICT in agriculture and lack time to incorporate ICT as they spend most of their day in fields and mostly have face-to-face interaction with fellow farmers, extension personnel, and agricultural scientists. Results were in line with Naik *et al* (2021). It might be due to different barriers in use of ICT by the farmers and affect their E-readiness. These barriers are discussed in following section of paper.

Barriers Affecting e-readiness of Farmers

Data regarding factors affecting e-readiness towards ICT were identified on the basis of five indicators *viz.* personal factors, technological factors, infrastructural factors, economic factors and cultural factors which obstruct ICT utilization.

Personal Barriers Affecting E-readiness of Farmers

About personal factors it was found that nearly 40 per cent of the farmers identified that lack of confidence in using ICTs was a barrier for them, while 28.00 per cent felt that youth has more access to ICT than old age and 38.00 per cent identified that fear of technology was the main concern for their limiting behaviour to use ICT. It also reflects that more than half of the respondents (52%) perceived lack of training as a hindrance in their use of

ICT. Majority of the respondents (68.00%) felt the inability to update the ICT expertise regularly was a major personal factor. A vast majority of farmers (70.22%) preferred ICT lesser and a substantial proportion of farmers (69.33%) lacked motivation to use ICT. Majority of the respondents (70.66%) lacked time to utilize ICT while a good proportion (69.77%) had security concerns regarding ICT. More than half of the farmers (55.55%) had language problems to use ICT and almost 44.44 per cent identified that illiteracy was obstructing them to use ICT in agriculture.

Technological Barriers Affecting e-readiness of Farmers

Technological barriers were another cause of limitation for farmers as 56.88 per cent of them identified power failure as major limitation while a vast majority (75.11%) felt that lack of computer facilities were limiting them. Almost 35.55 per cent of the farmers identified poor connectivity as another limiting factor and 35.11 per cent perceived poor network as a limiting factor.

Infrastructural, Economic and Cultural Barriers Affecting e-readiness of Farmers

In case of infrastructural barriers, the most important factor identified was lack of networking towers. Almost 29.33 per cent of the farmers identified it as limiting factor while 30.22 per cent said lack of ICT data centres were another

Table 4: Overall communication behaviour of farmers

Communication behavior	No. (%)	Mean ± S.D.
Passive (39-49)	130 (57.78)	50.36 ± 6.45
Active (49-59)	71 (31.56)	
Ongoing (59-69)	24 (10.67)	

Figure in parenthesis indicates percentage

Table 5: Personal barriers affecting e-readiness of farmers

Personal Barriers	No. (%)
Lack of confidence in using ICT	90 (40.00)
Fear of modern technology	85 (37.77)
Lack of training about how to use ICT	117 (52.00)
Youth is more active than old age group	165 (28.00)
Inability to update the ICT expertise regularly	153 (68.00)
Less preference in using ICT	158 (70.22)
Lack of motivation to use ICT	156 (69.33)
Lack of time to utilize the ICT	159 (70.66)
Security concerns	157 (69.77)
Lack of literacy	100 (44.44)
Language problems to use ICT	125 (55.55)

Figure in parenthesis indicates percentage

limiting factor. It can be seen that in case of economic factors that less income was identified by a vast majority (84.00%) of the farmers while 53.33 per cent perceived that subsidy through government was lacking. Lastly for cultural factors, it can be seen that more than half of the farmers (56.88%) felt that traditional belief regarding use of new technology was a factor while 54.66 per cent lacked faith in ICT based extension. Similar findings were also observed by Adnan *et al* (2022).

Conclusions and Policy Implications

The study examined communication behaviour and factors affecting ICT use in terms of e-readiness of farmers. The study illustrated that extension activities were the most availed information sources by the farmers while personal interaction was a highly popular method for disseminating farm information. For retrieving the information, memorizing method was mostly used by the farmers. Regarding

Table 6: Technological barriers affecting e-readiness of farmers

Technological Barriers	No.
Poor network availability	79 (35.11)
Poor connectivity	80 (35.55)
Inadequate computer facility	169 (75.11)
Power failure	128 (56.88)

Figure in parenthesis indicates percentage

Table 7: Infrastructural, Economic and Cultural barriers affectinge-readiness of farmers

Barriers	No.
Infrastructure factors	
Lack of ICT data centers	68 (30.22)
Lack of networking towers	66 (29.33)
Economic factors	
Less income	189 (84.00)
Lack of subsidized ICT through government	120 (53.33)
Cultural factors	
Traditional belief	128 (56.88)
Lack of faith in ICT	123 (54.66)

Figure in parenthesis indicates percentage

communication behaviour of farmer results displayed passive communication behaviour for large group of the farmers. The study also displayed that lack of time, security matter of using ICT, slow functioning of internet, power supply, server breakdown, health concern caused by ICT and poor network was one of the major problems identified by the farmers in all stages for effective use of ICT. The inability to update ICT expertise and lack of motivation and confidence were also important factors to take into consideration for proper utilization of ICT tools. Findings also show that farmers acquired less number of training on ICT and observed passive communication behaviour. All these play a role in shaping e-readiness toward ICT. Thus, it can be suggested that extension scientists should sensitize farmers to enhance the utilization of ICT.

The recommendations as per the study is for the government to launch various agricultural technology transfer schemes in collaboration with national and international private telecommunications businesses to improve farmers' access to ICTs. To increase the use of ICTs in agricultural avenues, there is also a need for mass awareness. The agriculture department should concentrate on providing internet facilities to extension service providers for easy access of agricultural-related information, especially in the local language. Extension organizations should be mindful to provide regular trainings on ICT to all the stakeholders of agriculture that could facilitate the adoption of ICT which for timely delivery of extension message, cover the man power shortages, save cost and the total transformation of agricultural development in the area. Additionally, more emphasis should be given to address personal factors and technological barriers that define the future of ICT.

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