



EMERGING TRENDS OF INFORMATION COMMUNICATION TECHNOLOGIES (ICTS) FOR AGRICULTURAL INFORMATION DISSEMINATION IN THE PUNJAB, PAKISTAN

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ABSTRACT

This study was conducted at Institute of Agricultural Extension and Rural development University of Agriculture Faisalabad, Pakistan during the year 2018. In Pakistan farmers are still reliant on traditional sources because information delivery system in Pakistan is not effective. Discrimination in information dissemination persists across the country as progressive farmers are generally preferred by extension workers for communication. EFS ratio is less as capered to farmers' ratio and extension staff is not able to disseminate information among all farmers. There are different information sources including traditional and modern media being utilized by farmers to nurture themselves with updated information. Among traditional sources, fellow farmers, extension field staff, radio and TV are more prominent tools perceived by farmers. However, information received through these mediums is considered partially effective and surrounded with constraints of cost, broadcasting, efficacy and relevancy. Inception of Information Communication Technologies (ICTs) rendered a new horizon to information dissemination process bearing potential of sharing information among large communities in no time. Therefore, it was considered essential to investigate the emerging trends and challenges in the use of ICTs and training needs of the users. For this purpose, total 400 respondents were selected through simple random sampling technique from two districts of the Punjab, Province. Data were collected through face to face interviews. Collected data were analyzed using Statistical Package for Social Sciences (SPSS). Qualitative data was also collected from extension field staff. On the basis of results study summarized that respondents were more familiar about the agricultural based radio and TV programs as compared to the internet and cellular based agricultural services. In case of tool free help lines Punjab agricultural help lines were much familiar among the respondents. While respondents were preferred mobile phone for getting agricultural information in future due to easy in use.

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Article received on:
15/10/2018

KEYWORDS: Agricultural information; Information communication technologies (ICTs); ICTs trends; information dissemination; Pakistan.

INTRODUCTION

Agriculture is the largest and dominant sector for growth and development of Pakistan's economy with having 19.5 percent contribution to Gross Domestic Product (GDP). This sector is source of income for 42.3 percent labor force 60 percent of the population is heavily dependent upon agriculture (Govt. of Pakistan, 2017). Unfortunately, share of agriculture in GDP is down falling with each passing year. The share of this in GDP was 24 percent in 2005-06 while in 2016-17 it has gone down to 19.5 percent (Govt. of Pakistan, 2017). According to Kamal *et al.* (2012) as compared to the other countries in Pakistan there is there is 53-82 percent yield gap.

Increase in production of crops is directly linked with the familiarity of farmers with agricultural innovations developed for farmers. Agricultural extension has

prime role in creating awareness and fostering adoption of latest technologies (Davidson *et al.*, 2005). In Pakistan, fast population growth requires significant increase in production; so, extension services have responsibility for the development of agriculture in Pakistan with information that enable farmers to make better decision in farming (Subedi and Garforth, 1996). Extension education is fulfilling specific tasks within their set objectives and principles (Moayedid and Azizi, 2011).

In the world, there is increasing demand of food and fiber due to the demand driven factors. To tackle these changes there is dire need of innovation in agriculture sector. Innovation mainly involves in the extraction of economic, ecosystem and knowledge, also aims to improve the performance by putting ideas, knowledge and technology in a systematic manner of working.

Dissemination of information and knowledge will become easier due to the development of Information and Communication Technologies (ICTs). The provision of information in agricultural sector will be revolutionized due to ICTs (David and Talyarkhan, 2005; World Bank, 2002).

Currently, in Pakistan ICT sector is promoting in the educational perspectives and enhancing the adoption rate of latest technologies. For instance, introduction of mobile internet and easy access of these services to poor farmers was major achievement that telecommunication policy exerted. Like many other countries of the world, in Pakistan information communication technologies is a growing sector of to facilitate farmers (Shahbaz *et al.*, 2013).

Electronic media included TV and Radio are the traditional source of information while in these days internet, mobile phone, agricultural helplines and computer are the emerging trends of modern days and have potential of disseminating required information within shortest possible time. However, effectiveness is dependent upon the nature and level of use of particular tool (Katz *et al.*, 2013). Various ICT tools considered effective according to various researches like Ekoja (2003) and Arokoyo (2003) mutually inferred that Radio along with TV were the prominent and effective information sources. Nazari and Hasbullah (2008) stated that radio and TV were highly effective tools in disseminating innovations because of their broadcasts for every farmer regardless of their age, gender and education. While, apart from traditional sources such as TV and Radio, some modern tools like internet are potential sources to facilitate farmers. Computer and internet are getting more popular in accessing agricultural information (Shetto, 2008).

Research Question

Agricultural information is considered as the most important component of agricultural development. Agricultural information is disseminating by both tradition and modern ways. The research question is therefor:

What are the emerging trends of ICTs for the agricultural information dissemination among the famers of Punjab, Pakistan?

MATERIALS AND METHODS

This study was conducted at Institute of Agricultural Extension and Rural development University of Agriculture Faisalabad, Pakistan during the year 2018. This study applied a survey research methodology using an interview schedule. The study was conducted in two randomly selected districts (Muzaffargarh and Rahim Yar Khan) out of 36 districts of Punjab. All the

farmers residing in study districts were considered as the population for the study. Selection of the respondents was made through multistage random selection technique. At first stage, two tehsils from each district were selected randomly. On second stage, a complete list of villages was obtained from revenue department of respective districts. From the list, five villages from each selected tehsil were selected randomly. After conducting initial survey with the help of local elite, field assistant and progressive farmers in the selected villages, a sampling frame consisting of 4012 farmers was developed. From that sampling frame, 20 farmers from each village were selected through random sample selection technique. For viable sample size, sample calculation formula developed by Yamane (1967) was used at 95% confidence level and 5% confidence interval. Resultantly, sample size comprises of 400 respondents. An interview schedule was developed for data collection. Five-point Likert scale was employed for collection of data regarding obtaining various kinds of information and future preference of ICTs. The collected data were then analyzed by Statistical Package for Social Sciences (SPSS). Descriptive statistics were used for meaningful transition of results. Weighted score was measured through below mentioned formula

$$F \times S = \text{Weighted score} \\ \text{while} \\ F = \text{frequency} \\ S = \text{scale}$$

Rank order was measured on the base of weighted score. In case of qualitative data, collected from Extension field staff were analyzed through content analysis technique.

Results

The findings of the study are presented in sub categories accordance with the research question

Familiarity of the respondents with the emerging trends of ICTs

In the modern era where innovations are happening for the facilitation of users specifically, for agricultural information. Traditional media have been upgraded to modern ones and emerging trends, i.e. social media, are full of potential to facilitate information seekers. This section highlighted the familiarity of the respondents regarding the emerging trends of ICTs. In the adoption process of latest technology familiarity is the most

important aspect because adoption is depending upon the basic knowledge about the technology.

Table 1. Respondents' familiarity regarding radio/FM based agricultural programmes

Agri. radio/FM broadcasts	Familiarity			
	Yes		No	
	f	%	f	%
Utam Kheti (Multan)	141	35.25	259	64.75
Dharti Bakht Bahar (Bahawalpur)	113	28.25	287	71.75
Khet Khet Haryali (Lahore)	11	2.75	389	97.25
Jithey Terey Hal Wagday (Lahore)	06	1.5	394	98.5
Sandil Dharti (Faisalabad)	03	0.75	397	99.25
Wasda Raye Kissan (Sargodha)	00	0.0	400	100.0
Wasney Rehan Garan (Rawalpindi)	00	0.0	400	100.0
Thal Singhar (Mianwali)	00	0.0	400	100.0
Zarkhaiz Pakistan (Islamabad)	00	0.0	400	100.0

Data depicted in Table 1 are all about various agricultural programmes of Radio/FM regarding dissemination of agricultural information. Radio Pakistan is broadcasting various regional programs across the country. In this regard, *Utam Kheti* was the leading programs known to approximately 35.3% of respondents. This program is broadcast of radio Pakistan "Multan" station. Radio program "*Dharti Bakht Bahar*" broadcast of Radio Pakistan Bahawalpur, was known to 28.3% of the respondents. During informal discussion it was found that inclination of respondents was towards these programs. There are number of other broadcasts of different radio stations, but their awareness was

negligible among respondents. The main cause of this unawareness was restricted broadcast of these radio stations in other districts. Quite interestingly, radio programs "*Khet Khet Haryali*" and "*Jithey Terey Hal Wagday*" broadcast of Lahore and "*Sandhal Dharti*" from Faisalabad radio stations were known to negligible number of respondents. Respondents claimed that their relatives and friends residing in these areas were the major source of information in this context. However, awareness was mere a familiarity, they have never listened to these programs. They further acclaimed that if these programs were broadcasted in our region, they would have listened these programs.

Table 2. Respondents' familiarity regarding TV based agricultural programmes

Agri. TV telecasts	Familiarity			
	Yes		No	
	f	%	f	%
Zamindara (Waseb TV)	156	39.0	244	61.0
Khaiti (Rohi TV)	140	35.0	260	65.0
Haryali (PTV home)	124	31.0	276	69.0
Kissan Time (Channel 5)	71	17.75	329	82.25
Khait Punjab Day (Punjab TV)	9	2.25	391	97.75
Zarat Nama (ATV)	2	0.5	398	99.5
Dehat Sudhar (Sohni Dharti)	0	0.0	400	100.0

The data depicted in Table 2 show awareness of TV programs among respondents. Only two programs "Zamindara" broadcasted on Waseb TV and "Khaiti" a broadcast of Rohi TV were the prominent ones, as reported by 39 and 35% respondents. Respondents perceived these programs informative because of being broadcasted in local language "*Saraiki*". During discussion it was also unveiled that low awareness

may be attributed to limited connections of cable network. More often these channels are aired on cable network except PTV home which is national TV of the country and "Haryali" is the only broadcast related to agriculture on national TV. Less than one fifth (17.7%) respondents knew "Kissan Time" program on channel 5. The interesting fact unveiled was, that majority of respondents was familiar with "Kissan Time" because

it has been broadcasted on different channels since recent past. Though respondents were unaware about the current status of program. Similar trend was seen regarding broadcast of "Sohni Dharti". Hence,

awareness about broadcasts of ATV, Punjab TV and Sohni Dharti were almost negligible.

Table 3. Respondents' familiarity regarding emerging trends of internet based agricultural information dissemination services

Internet (web based)	Familiarity			
	Yes		No	
	f	%	f	%
Agri. websites	31	7.75	369	92.25
Fertilizer calculator	15	3.75	385	96.25
e-marketing	6	1.5	394	98.5
Social media	12	3.0	388	97

According to data mentioned in Table 3 only 16.1% of respondents were familiar with the trends in available internet-based services. According to the data,

agricultural websites, fertilizer calculator, e-marketing services and social media were known to 7.8, 3.8, 1.5 and 3% of respondents, respectively.

Table 4. Respondents' familiarity regarding emerging trends of cellular apps based agricultural information dissemination services.

Mobile (apps & helpline)	Familiarity			
	Yes		No	
	f	%	f	%
Bakhabar Kissan (Helpline 03030300000)	121	30.25	279	69.75
Khushal Zaminadr (Helpline 7272)	50	12.5	350	87.5
Warid Kissan Line (Helpline 2244)	45	11.25	355	88.75
Agricultural Business	34	8.5	366	91.5
Animal Clinic	31	7.75	369	92.25
Zong Kisan Portal (Helpline700)	30	7.5	370	92.5
Agriculture Corner	30	7.5	370	92.5
Facebook Pages	19	4.75	381	95.25
Plant Clinic	23	5.75	377	94.25
UKisaan (Helpline700)	23	5.75	377	94.25
Horticulture UAF	19	4.75	381	95.25

Cellular companies provide a number of mobile based services for the farmers. Among these services, the majority is helplines based in the form of cellular apps, applicable on smartphones. Data presented in Table 4 are illustrative of the familiarity of respondents with available mobile-based services. It is evident that Bakhabar Kissan was the leading helpline service known to 30.3% of respondents. Khushal Zamindar and Warid Kissan Line were known to 12.5 and 11.3% of respondents, respectively. Familiarity of rest of the helpline and mobile app services was less than 10%. This implies that awareness of these services among respondents was almost negligible.

Familiarity of rest of the apps and services like plant clinic, facebook pages, agricultural business, animal

clinic, Ukissan and Horticulture UAF was almost negligible. There is no doubt in the potential of mobile and mobile based services, but below average awareness is questionable which further documents that farmers are not fully aware about the potential of mobile phone for sharing and receiving agricultural information. Findings of Kirui et al. (2010) negate the present results. Their findings iterated that mobile based service like m-banking was widely known to farmers. Transactions made through m-marketing were being invested on improving farm operations and production level. Farmers were involved in sharing latest, site specific and market driven information through mobile based social services (Ilahiane, 2007). Findings of Chhachhar and Hassan, (2013) endorsed

that mobile services enabled farmers to communicate directly with marketing agents and brokers and also with meteorological department for weather related information (Duncombe, 2011). It can be concluded

that mobile is one of the effective media to bridge information gap enhanced access to information, but in Pakistani settings farmers are yet underprivileged in this regard due to less education.

Table 5. Respondents' familiarity regarding emerging trends of helpline services (public & private) regarding the agricultural information dissemination

Toll free helpline services (public & private)		Familiarity			
		Yes		No	
		f	%	f	%
Helpline	Source				
0800-15000	PAH (DAI)	46	11.5	354	88.5
0800-29000		42	10.5	358	89.5
0800-78686	L&DD	23	5.75	377	94.25
0800-78685		17	4.25	383	95.75
0800-54726	Kissan Dost	17	4.25	383	95.75
0800-00332	FFC	11	2.75	389	97.25

Note: (Punjab Agricultural Helpline) PAH, Directorate of Agricultural Information (DAI) Livestock & Dairy Development (L&DD), Fujji Fertilizer Company (FFC)

Data depicted in Table 4. 20 indicate trends of public and private helpline services and their role in dissemination of agricultural information among farmers. There are different helplines served by different public and private organizations. Helplines served by PAH were known to 11.5 and 10.5% of respondents. While helplines of L&DD were known to 5.8 and 4.3% of respondents followed by the helpline of Kissan Dost which was familiar to 4.1% of respondents. Helpline offered by FFC was known to only 2.8% of respondents. This confirms that emerging trends of helplines are scanty in gaining interest of farming community. Aldosari et al. (2017) stated that only 14.2% respondents were familiar and in consensus with use of helpline for information acquisition. These findings are in line with

the present study that familiarity of helpline is meager among farming communities.

"Discussion with EFS further confirmed that farmers were reluctant in using helplines for information acquisition. It was also highlighted that farmers perceived use of helplines as time consuming process"

Various Information obtaining from ICTs

Respondents were using ICT tools for obtaining various kind of information from different ICT tools. Therefore, respondents were asked to unveil that what kind of information they had obtained from ICT tools. Collected data using Likert scale (1=never, 2=rarely, 3=some time, 4=often, 5=always) is presented in Table 6.

Table 6. Various information obtaining from ICTs by the respondents

Information	Weighted score	Mean	Std. Dev.	Rank
Production of major Crops (wheat, cotton, rice, sugarcane etc.) or Farm production	1402	3.51	1.648	1
Plant protection measures (pest, insects and disease management)/Farm protection measures	1307	3.27	1.529	2
Weather updates	932	2.33	1.463	3
Livestock & Poultry management	930	2.33	1.336	4
Harvesting and post harvesting practices	838	2.10	1.245	5
Agricultural marketing of produce	752	1.88	1.168	6
Farm resource conservation	716	1.79	1.067	7
Access to credit	683	1.71	1.125	8
New cropping scheme	656	1.64	1.113	9

Data depicted in Table 6 that respondents were utilizing agricultural helplines for different venture of agriculture. Data show that respondents were more concerned about production process of different major crops. The study area was typically cotton oriented; hence, more focus was on receiving agricultural information regarding production and protection of standing crop. Information acquisition regarding production of major crops stood on 1st rank with mean value of 3.51 followed by plant protection measures obtaining 2nd rank and mean value of 3.27. Weather updates and livestock management stood on 3rd rank and 4th with mean value of 2.33. Conversely, Etwire et al., (2017) rate the information received related to weather as useful. Mital, (2012) illustrated that about 90% Indian farmers received weather related information through phone and reported useful. Another study conducted in Tanzania by Angello, (2015) unveiled that 96.5% farmers reported weather related information acquisition through mobile and rated useful in improving livestock. This implies that mobile is a vital source from where diversified information could be harnessed. Unfortunately, in current study scope of receiving information using mobile is not up to the mark. This inadequate information may lead those farmers to increase their production cost and low farm production (Mawazo, 2015) and poor returns (Courtois and Subervie, 2013). In actual, farmers could choose and plan better to improve their farm level production through seeking information through mobile (Asenso-Okyere and Mekonnen, 2012). Further data is self-evident that information regarding

harvesting of crop, marketing of harvested produce, farm resources conservation, access to credit and familiarity with new cropping schemes appeared ranging between low and very low level. This implies that farmers were unknown to this hidden potential of mobile phone. It also can be concluded that farmers may have any other source to meet the information requirement on these aspects.

“Extension Field Staff summarized extensive use of mobile phone. Farmers used to make calls to Agriculture Officers and Field Assistants for acquiring information on multiple aspects including production and protection aspects. Agriculture Officers mostly stated that now a days’ farmers tend to be informed regarding subsidy schemes for government. Despite of availability of latest information on websites, farmers poorly prefer to visit those websites and prefer mobile phone”

Preferred ICTs of respondents

After assessment of familiarity of the users with emerging trends of ICT, respondents were asked to unveil that which information tool they would like to prefer for effective information acquisition in future. Further extent of preference was measure by using the Likert scale (1=very low, 2=low, 3=medium, 4=high, 5=very high). Data in this regard is presented in Table 7.

Table 7 Extent of future preference of ICTs given by respondents to various ICTs for getting agricultural information

ICTs tools/ devices/ medium	Extent of preference			Rank
	Weighted score	Mean	Std. Dev.	
Mobile	1216	3.86	1.156	1
TV	878	3.28	1.303	2
Radio/FM	537	3.12	1.141	3
Internet	277	3.04	1.357	4
Agri. Websites	204	2.55	1.509	5
Agri. Helplines	196	2.55	1.187	6
Computer	144	2.25	1.208	7
Land line Phone	114	1.84	.891	8

According to the data depicted in Table 7, mobile appeared most concerned ICT tool in future for agricultural information. Mobile obtained mean value of 3.86 and preference by 78.8% of the respondents, thereby cemented 1st rank. TV appeared 2nd ranked

ICT tool with mean value of 3.28 followed by Radio obtaining mean value of 3.12. Meanwhile, about 67% and 43% of the respondents agreed that they would like to prefer TV and radio in future respectively. During informal discussion respondents iterated that

future use of ICT tool is subject to broadcasting of agricultural programs. Internet obtained mean value of 3.04 and 4th rank in terms of preference. Respondents argued that utilization of internet is dependent upon knowledge and skills which are scanty at present. Ekundayo and Ekundayo (2009) revealed that limited experience of computer uses among respondents prevented e-Learning uptake. For effective utilization of internet, it is imperative to enrich farming communities with extensive knowledge of internet use. Similar concern was posed by the respondent regarding use of agricultural websites. Use of websites, helplines, computer and landlines phone were least preferred ICT tools, as expressed by the respondents. Further inadequate computer literacy among respondents could be the possibly reason behind least preference of computer use. Adoption of e-Learning technologies are associated with civilizing computer literacy (Ngamau, 2013).

“Extension Field Staff expressed that, optimizing use of websites, helplines and computers for information exchange is full of potential. Hence, Government and institutions should diversify their role and offer accessible services on websites for farmers”

CONCLUSION

This study assessed the emerging trends of ICTs among the farming community in Punjab. Survey showed that farmers have less awareness regarding the latest ICT trends like cellular application, internet and web-based sources of agricultural information. While respondents have familiarity about the traditional agricultural source like radio and TV. While in case of tool free helplines respondents were familiar about Punjab agricultural helplines. Further, for future use, they also preferred mobile phone for getting agricultural information due to easy in use.

RECOMMENDATIONS

Government, agriculture department, research and educational institutes should focus on to develop mobile based information delivery mechanism for effectively dissemination of agricultural information.

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