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IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS) ON AGRICULTURAL EXTENSION SERVICE DELIVERY IN THE PROVINCE OF PUNJAB-PAKISTAN

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ABSTRACT

Extension workers are primarily responsible for managing, processing and dissemination of the information needs of farmers and cattlemen in agriculture sector which is considered backbone of economy of Pakistan. Keeping in view the importance of ICTs, the present study was designed to formulate a comprehensive communication strategy to enhance the role of information and communication technologies (ICTs) in agricultural extension service delivery. The study was conducted in the Punjab, the largest agricultural province of the country during 2016. The population for the study comprised of extension officers and staff of agriculture and livestock departments and extension staff of private companies. Purposive sampling technique was applied for the selection of representative sample from the population. Similarly, quantitative method was employed for data collection and analysis purposes. Overwhelming majority of the participants considered the effectiveness of ICTs over traditional ways of information and communication. For majority of extension workers, television (TV) was the dominant source of information, followed by telephone/mobile phones. Similarly, according to majority of extension workers, telephone/mobile phone was providing timely information whereas more useful and detailed information was received via internet. Most of the younger extension workers found ease in communication with the help of ICTs, whereas for older extension workers ICTs helped in increasing of information level. Extension workers also

revealed barriers to the integration of ICTs. Major barriers include information delivery at inappropriate times, unavailability of information in local languages and irrelevant, outdated, useless and inadequate information. Extension workers also revealed various enablers for enhancing integration of ICTs. Major suggestions include agricultural information should be provided in local languages and through mobile phones. It was also suggested that appropriate information should be disseminated as per segmentation and demographics attributes of farmers.

Keywords: Information & Communication Technologies, ICTs, Agriculture, Barriers, Enablers, Information, Communication, Extension workers

INTRODUCTION

Primarily, Pakistan is considered an agricultural country. Agriculture is the backbone of Pakistani economy as it is nourishing the immensely growing population of the country. It contributes 20.9 % of Gross Domestic Product (GDP) as well as 43.5% of the labour force of the country (Pakistan Economic Survey 2014-15).

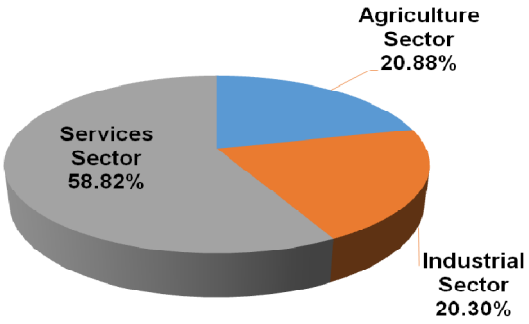

Figure 1: Contribution of Different Sectors in GDP of Pakistan

Source: Economic Survey of Pakistan 2014-15 [1]

Agricultural extension is acknowledged as the dominating force for agricultural development and capacity building of stakeholders as it is the only service that enables poor farmers living in remote areas for transfer of technology. Many extension services were being practiced in past for the well-being of farmers. In this connection, several initiatives particularly, Village aid program, Village cooperate system, integrated rural development program (IRDP), Basic Democracy System (BDS) and Training and Visit (T&V) Program are worth mentioning examples of such fruitful steps under the aegis of the extension program in Pakistan in general and the Punjab in particular. Unfortunately, Pakistan has still not

benefitted from modern ways of information and communication like developed nations including USA, Australia, Sweden, China, western and central Europe. These countries produced tremendous output by utilizing modern methods of cultivation coupled with technological based innovation disseminated through CMC (Computer Mediated communication). Directorate of Agricultural Information, Punjab is officially assigned for managing, processing and dissemination of the information needs of farmers and other stakeholders. Directorate of Agriculture provides information, skills and resources to small farmers in order to enable them for linking with consumers and high value markets. Directorate also enables farmers by providing the latest and accurate information about stock, production, scientific prediction, and import and export prices. Regional disparity is being eliminated by the directorate with the incentives for production of high-value crops in neglected areas of the province. There is a variety of communication means that are being used by the Directorate of Agricultural Information, Punjab for the education of farmers across the province, for example, agri journals, newspapers, magazines, brochures, banners, website, mobile apps, call centre and SMS help line [2].

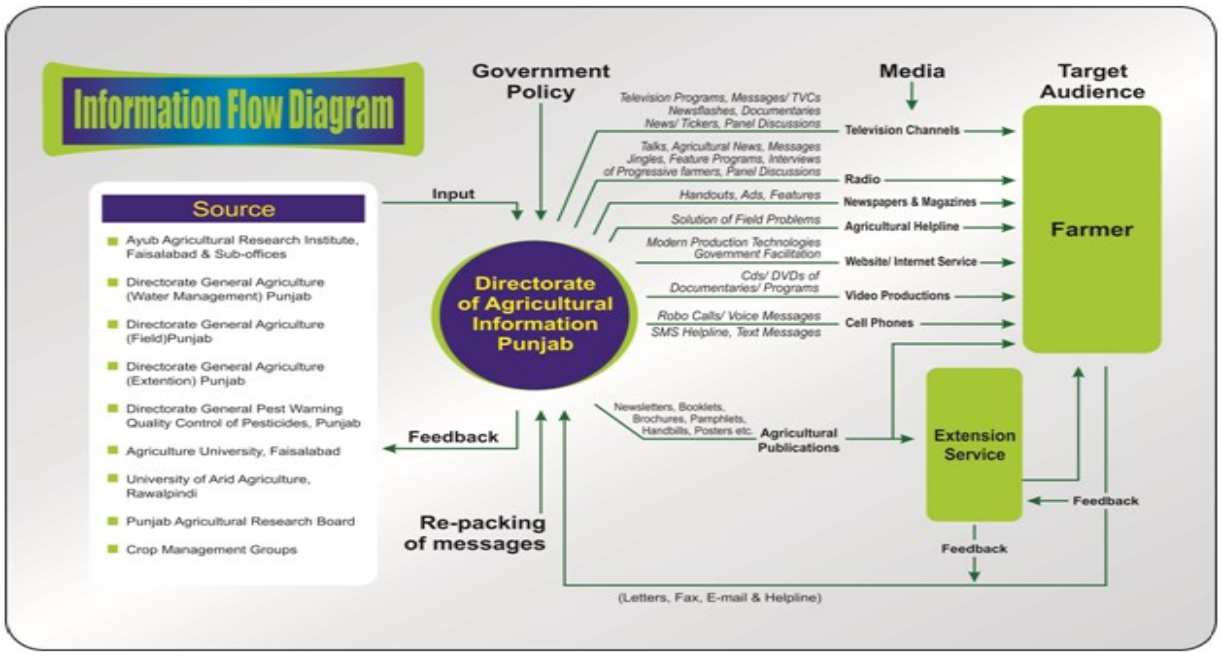

Figure 2: Agricultural Information Flow Diagram
Source: AgriPunjab, [2]

The Directorate of Communication & Extension was formulated in 2009 under a development project titled "Strengthening of Communication & Extension Network in

Livestock Department". The chief purpose of establishing the directorate is to strengthen communication and information flow among stakeholders of livestock and dairy development. Both conventional and modern communication tools are being used by the directorate. Youth of the province (students of 9th and 10th classes of government schools) is being sensitized by the directorate in a drive to convince their parents, friends and relatives. Training sessions for the extension staff are also conducted by the directorate where top agricultural and livestock experts are invited. Information and Communication Technologies (ICTs) are also effectively used by the directorate for filling the information needs of extension staff and cattlemen of the province [3].

Information is very critical for stakeholders of agriculture. If information needs are met, it is very easy for them to grow exponentially. There is shortage of information for farmers of developing world and they always need authentic knowledge and information on agricultural matters. In this context, mere enhancement in the volume of the information would not produce the desired results if holistic approach is not adopted as well as coupled with access to additional and diverse knowledge, coming from numerous stakeholders like policy makers, educators, scientists, advisors and producers [4].

Information and Communication Technologies (ICTs) are considered as an important addition into modern technology. According to Blurton [5], ICTs are various resources and tools which are used to create, store, disseminate and manage information. Usage of computer, internet, geographical information systems (GIS), mobile phones, as well as electronic media such as radio and TV is included in ICTs. It is also the integration of various communication technologies and ways of communication and delivering desired information to target audiences so that they may actively participate in the target fields [5].

Both developed and developing countries witnessed tremendous growth of ICTs. By the end of 2015, 3.2 billion people were using Internet out of which about 62.5% were from developing countries. However, 2/3 people of developing world, i.e. 4 billion were still offline. Similarly, there were only 9.5% (940 million) internet users from least developed countries (LDCs). Mobile phones are the most convenient way of information exchange. A variety of options are available for mobile subscribers that include SMS, telephony, radio, TV, voice and data. Growth of mobile phones is many folds higher than other telecommunication tools. It is strongly

believed that ICT is the key player to bring social, economic and societal development in both developed and developing countries [6].

LITERATURE REVIEW

Information and Communication Technologies (ICTs) in agriculture are capable in providing extended access to information that is capable to support and drive sharing of knowledge. In old days, radio, television and films were main broadcast technologies that were being used for dissemination of information to rural people. However, at present modern information and communication technologies are being used such as internet and mobile phone. Modern tools of communication and computer/mobile based applications are now included in ICTs. These modern technologies include online or offline digital information repositories, social media, videos, mobile phones and digital photography. ICTs are the blend of various media even print media has also been included. E-papers are available online and one can get information through these at ease. Although there are many issues regarding access to ICTs in our country but it is becoming popular among farmers due to massive potential and ease [7]. There are many other tools of ICTs to meet information needs of farmers that include delivery of extension messages and sale or bid opportunities through voicemail or text messages. In Kenya daily agricultural commodity prices are provided to smallholders through SMS. All information delivery methods are linked electronically through a latest information system which enables farmers to connect with potential buyers thorough various urban centres [8,9]. In Senegal price data of various crops, obtained from different markets of the country, is disseminated through Manobi. Here mobile phones are used by the Manobi officials to send information to registered farmers via wireless application protocol (WAP). The same information is retained by the farmers through their mobile phones [10]. Importance of Livestock and dairy development is well felt by the Texas A&M University who developed a Livestock Information Network and Knowledge System (LINKS). It was developed as a sub project of the global livestock collaborative research support program. LINKS regularly transmits information about livestock volume and price to east African livestock markets, i.e. Kenyan, Tanzania and Ethiopia. To support decision making at multiple scales, it also provides real time information regarding disease outbreak, forage conditions, conflict and water supply through internet, email, SMS and WorldSpace radio systems [3].

ICTs can also help in enhancing the process of information delivery to farmers. Although role of ICTs was widely recognized by the stakeholders of agriculture but sufficient attention was not given to it. Therefore, supply of information to farming community was poorly organised, scattered and totally unfocused. Most of the extension workers were not using ICTs in their information delivery to farmers. They also rarely depend on information gained through internet however, a large number of farmers were depending on internet searches [11]. eArik Village Knowledge Center, established in North East India helps farmers to access ICT based information. There was positive impact of eArik Village Knowledge Center among farmers since 42% of beneficiaries reported increase in rice production and 29% beneficiaries reported increase in Khasi mandarin crops. Numerous sustainable farm practices, propagated to them by eArik staff, were also implemented by the farmers. These include bunds and ridges for water retention, verimi compost, stone contour bunds, crop rotation, agro-forestry, planting leguminous plants for nitrogen fixation and indigenous pest management. Income of eArik beneficiaries was also increased to many folds, i.e. approximately Rs. 5251 for Khasi Manadarin trees and Rs.1689 for Rice crop. Further, eArik advisory services helped farmers to save time and cost in accessing agricultural information. For example approximately Rs.2400 per year were saved for each farmer against travelling cost. To achieve more success from ICT based extension education all stakeholders of agriculture, i.e. departments of agriculture, fisheries, horticulture, livestock, farm input dealers, NGOS, agribusiness firms and private knowledge providers should collaborate actively [12]. Similarly, both small and large farmers showed interest in obtaining latest agricultural information through radio and television. More than 70% farmers were inclined towards information delivered through electronic media channels. Benefitting from agricultural programs was higher among farmers of Faisalabad as compared to farmers of other districts of Punjab. Farmers with higher landholding were seeking agricultural information through broadcast media more than smallholder farmers. For most of the farmers, broadcast time of agricultural programs was suitable however; many farmers suggested that time slot should be from 8PM to 9PM [13].

There was positive and huge demand for ICTs among extension agents in Ghana. Respondents were well aware of the benefits of using Information and Communication Technologies (ICTs). Majority of

respondents (96%) revealed that updated information on agriculture can be provided by the ICTs. Similarly, a large number of respondents (96.5%) believed that ICTs can ease information exchange among stakeholders of agriculture. However, there is need to extend ICT infrastructure, training opportunities, technical backstopping and financial resources for further promotion of ICT usage for extension work. Universities, computer training schools, internet cafes and information centre of research institutions should be collaborated with extension organizations for effective infusing of ICTs in extension programs. Donor agencies and international institutions like FAO and World Bank can make the difference if collaborated well with extension organizations [14]. Similarly, performance of the extension workers heightened to many folds with the application of computer and internet. Most of the extension workers found computer and internet usage very helpful in their information delivery and communication with other stakeholder. Majority of extension workers reported to have computer and internet access both at home and office. Younger extension workers showed high level of computer and internet skills than older extension workers. More educated extension workers were more skilful as compared to less educated workers. Similarly, more experienced workers showed less computer and internet skills as compared to less experienced workers. There is dire need for the training of the extension workers as it can make the difference, [15]. However, private extension system failed to communicate effectively and in a result-oriented manner. Effectively communicating a message is much more important than mere delivery of message. Private agricultural extension services should focus much of effective communication instead of mere communication [16]. Usually, North Indian farmers get agricultural information from a wide range of sources and channels. These include district and block level agriculture/ horticulture offices, Krishi Vigyan Kendras (Farm Science Centres), daily local language newspapers, agri portals, television, friends and relatives, helpline, farmers' cooperatives, radio, private dealers, input agencies and mobile phones. People often depended on more than one source/ channel for information. Mobile phones were also used excessively for accessing markets or price information or increasing production efficiency but most of the times for post sale inquiry instead of price negotiation [17].

Objectives of the Study

Following are the main objectives of the present research study:

- The present study would explore the usability of modern information and

communication tools to enhance and expedite the services utilized by the extension workers.

- Present research study will help extension workers in selecting modern and efficient ways of communication for delivery of information.
- This research work would pinpoint the loopholes and the problematic areas which create obstacles in the effective integration of Information and Communication Technologies (ICTs).
- The findings of this research work would chalk out further strategies, recommendations and solutions regarding fixing of the numerous problems being faced by the extension workers.
- The study will also explore the potential role of ICTs in agriculture sector for improving farm practices and agricultural development of the country.

MATERIALS AND METHODS

Purpose of the present study was exploring the impact of Information and Communication Technologies (ICTs) on agricultural extension service delivery in the province of Punjab-Pakistan. The study was conducted during 2015-2016 in the Punjab province. Quantitative research method was applied to answer research questions. Survey questionnaires were developed for extension workers. Most of the questions of these questionnaires were close ended; however, some open ended items were also included. Once the questionnaire was formulated it was translated into Urdu language and presented to language expert for reviewing. Afterwards, the same was given to five extension workers for checking the validity of questions and their response items. Once they ratified its language and contents, it was presented to the participants of the study for seeking responses. Both online and offline survey questionnaires were presented to participants for recording their inputs. Offline survey questionnaires were got filled via phone calls. However, link to online survey questionnaires was sent to participants through SMS, WhatsApp messages and facebook chat. Study population mainly includes extension workers of agriculture and livestock departments. Purposive sampling technique was applied to select respondents from extension staff of public and private sectors. 243 respondents from agriculture department (agriculture officers and field assistants), livestock and dairy development department (veterinary officers and assistants) and private extension officers and officials recorded their responses. Online

survey form was also designed wherein 47 respondents recorded their responses. Descriptive analysis, crosstab examination and chi-square tests were employed for data analysis and discussion.

RESULTS AND DISCUSSION

It was found that most of the respondents from Toba Tek Singh, Gujranwala and Rawalpindi districts participated through online questionnaire. Some respondents from Kasur, Faisalabad, Chiniot, Pakpattan, Jhang, Hafizabad, Mandi Baha-ud-Din, Jehelum, Sargodha, Minawali, Sahiwal, Okara, Multan, Vehari and Lodhran also participated by online questionnaire filling. However, offline questionnaire was got filled via telephonic calls by extension workers from all divisions of Punjab. Agriculture and livestock sectors are mainly male dominated professions so most of the respondents were male. Only 2 female extension workers participated in the study through mobile phone whereas no female extension worker participated through online questionnaire. Majority of extension workers were more than 45 years of age. Furthermore, 33.7% were 36 to 45 years old and 27.6% were young from 26 to 35 years of age. No extension worker was having less than 26 years of age. Most of the extension workers, i.e. 59.7% were matriculate; whereas, 19.8% were having intermediate qualification, followed by 13.2% graduates. Moreover, 7% extension workers were having masters, M.Phil or PhD degrees. Whereas, majority of online participants were having more than graduation qualification (46.8%), followed by graduates (34%) matriculate 10.6% and intermediate 8.5% respectively.

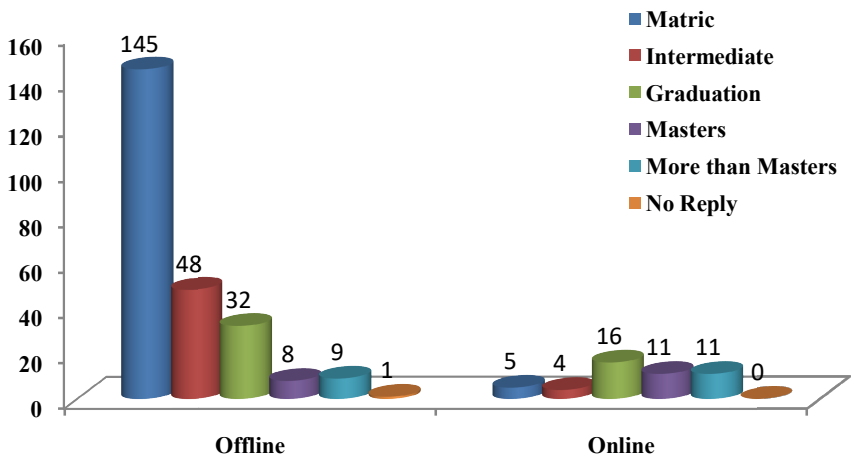

Figure 3: Formal Education

Majority of extension workers, i.e. 77.4% were having agri/veterinary diploma, followed by agri/veterinary graduates 15.6%. 27.6% workers had 11 to 20 years experience whereas 21% were having 21 to

30 years experience. 40 extension workers had even more than 30 years of experience. On the other hand, extension workers who participated via online questionnaire were not much experienced as most of them, i.e. 46.8% were 5 to 10 years of experience and 25.5% had even less than 5 years experience.

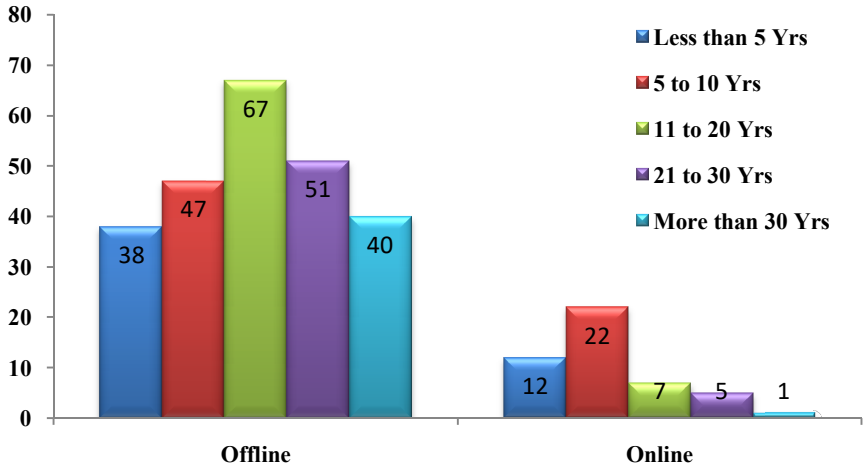

Figure 4: Job Experience

Majority of extension workers revealed that they prefer face to face communication (offline 49.4%, online 53.2%), followed by telephone/mobile phones (offline 32.9%, online 27.7%) and seminars/group meetings (offline 16%, online 19.1%).

The extension workers have very crucial role in dissemination of agricultural information and updates to farming community. A large number of farmers and cattlemen rely on extension workers for the fulfilment of their information needs. In order to better serve farmers and cattlemen, extension workers needs to be updated regarding agricultural information and updates. The extension workers of both agriculture and livestock departments heavily rely on ICTs for fulfilment of their information needs. It was found that television (TV) was the dominating source of information for majority of extension staff. Similar findings were given by Irfan, *et al*. [18], Chhachhar, *et al*. [19] and Zia & Khan [20]. Similarly telephone/mobile phone was third and internet/social media was fifth most consulted source of information for extension workers. Radio was least consulted by the extension workers for fulfilling their information needs. They seek information from ICTs due to varying reasons such as for majority of extension workers ICTs provide detailed information about agriculture and livestock. For many extension workers, channels of ICTs are easily available as well as they provide more

useful information. For many of them, channels of ICTs provide timely information due to which they prefer getting information from these channels. For most of the extension workers, telephone/mobile phone was providing timely information, followed by television (TV), whereas more useful and detailed information was received from internet. A large number of extension workers stated that ICTs also help in providing information about modern agricultural practices. Results are also consistent with the findings of Aker [21], Okello *et al*. [6] and Veeraraghavan *et al*. [17].

Majority of extension workers also confirmed the usefulness of information obtained through ICTs. Radio was the only source from which very few extension workers were getting useful agricultural information and updates. The information obtained through ICTs also helped extension workers in increasing information, obtaining solutions of problems quite easily, finding ease in communication, getting instant and reliable solutions of problems, getting more than one solutions of problems, better understanding of agricultural issues and getting proof of success. The results are also consistent with the findings of Annor-Frempong, *et al*., [14] and Deloitte [22]. The extension workers also confirmed that they would prefer ICTs for information seeking in future too. Telephone/mobile phone was the number one choice for majority of extension workers as futuristic information source, followed by internet/social media. However, television (TV) was the fifth choice for seeking futuristic information by most of the extension workers. Similarly, most of the extension workers desired that agricultural information may be provided to them via mobile phones and it should also be in local languages.

Most of the younger extension workers found ease in communication with the help of ICTs, whereas for older extension workers ICTs helped in increasing of information level. The results are consistent with the findings of Wims [23]. Similarly, for majority of less educated extension workers, ICTs helped in increasing of information level, whereas more educated extension workers found in communication with the help of ICTs. Most of the less experienced extension workers got solutions of problems easily with the help of ICTs, whereas much experienced extension workers stated that ICTs helped them to increase their information level as well as ease in communication. Most of the extension officers stated that with the help of ICTs, they found solutions of problems quite easily whereas agri/livestock assistants excessively increased their information level with the help of ICTs. Farmers and

cattlemen also got various benefits with the help of ICTs. These results are consistent with the findings of Mittal and Tripathi, [24], Okello *et al*. [6].

According to agriculture/livestock extension workers, major barriers include information delivery at inappropriate times, unavailability of information in local languages and irrelevant, outdated, useless and inadequate information. The unavailability of information in local languages was the major obstacle for matriculate and older extension workers; however, information delivery at inappropriate times was the major obstacle for extension workers having less than 5 years of experience. For most of the farmers and cattlemen, major obstacle for the integration of ICTs was the provision of information at inappropriate times. The unavailability of information in local language was the second major obstacle in this regards. Some other major obstacles, revealed by the farmers and cattlemen included outdated information, inadequate information, irrelevant information and useless information respectively. In a similar study, Karugu, [25] revealed many barriers including high costs of mobile phone calls, SMS and IVRs, ICT illiteracy of farmers, limited human and financial capacity, long chains of transaction between consumers and farmers, inefficient and poorly structured markets and poor access to timely and reliable market information.

Almost all participants of the study affirmed the effectiveness of ICTs over traditional ways of information and communication. They were convinced that information needs of farmers and cattlemen can be fulfilled easily with the help of ICTs. Younger extension workers were excessively employing ICTs as compared to older farmers were also supported. It is evident from the results that utilization of ICTs is far higher in younger extension workers as compared with their older fellows. The participation via online questionnaire filling was also made exclusively by the younger participants. Almost all participants of the study were satisfied with the role of ICTs; however, there were some limitations in the practice of these modern ways of information and communication.

The extension workers of both agriculture and livestock sectors suggested that for enhancing the integration of ICTs agricultural information should be provided in local languages and through mobile phones. The number of programs providing agri. information may be increased, agri. literature may be increased in newspapers, broadcasting time of agri. programs may be changed, and relevant and beneficial information may be provided to farmers and

cattlemen. They also suggested that segmentation of farmers may be made and then most relevant information should be provided to them.

REFERENCES

[1] Wasti S. Economic Survey of Pakistan 2014-15. Islamabad: Government of Pakistan, (2015).

[2] PAD. Punjab agriculture department, Agriculture Department, Punjab. (2015).

[3] LMIS. Livestock Market Information System (LMIS). Livestock Market Information System. . (2011).

[4] Swanson BE BRSA. Improving Agricultural Extension. A Reference Manual, FAO, Rome. (1998).

[5] Blurton C (1999) New directions of ICT-use in education. UNESCO's World Communication and Information Report.

[6] Okello JJ, Ofwona-Adera E, Mbatia OL, Okello RM. Using ICT to integrate smallholder farmers into agricultural value Chain: The case of DrumNet project in Kenya. International Journal of ICT Research and Development in Africa (IJICTRDA), (2010); 1(1): 23-37.

[7] Balaji V, Meera N, Dixit S. ICT-enabled knowledge sharing in support of extension: addressing the agrarian challenges of the developing world threatened by climate change, with a case study from India. Journal of SAT Agricultural Research, (2007); 4(1): 1-18.

[8] Davis K, BK Addom Sub-Saharan Africa. In Saravanan, R., (Eds), ICTs for agricultural extension: Global experiments, innovations and experiences. Chapter: Book Name. 2010 of publication; New India Publishing.

[9] Muriithi AG, Bett E, Ogaleh SA. Information technology for agriculture and rural development in Africa: Experiences from Kenya; 2009.

[10] ITU. World Telecommunication/ICT Development Report. Monitoring The WSIS Targets - A mid-term review. International Telecommunication Union (ITU), Geneva, Switzerland. (2010).

[11] Kalusopa T. The challenges of utilizing information communication technologies (ICTs) for the small-scale farmers in

Zambia. Library Hi Tech, (2005); 23(3): 414-424.

[12] Raj S. e-Agriculture prototype for knowledge facilitation among tribal farmers of North-East India: innovations, impact and lessons. The Journal of Agricultural Education and Extension, (2013); 19(2): 113-131.

[13] Abbas M, Sheikh A, Muhammad S, Ashfaq M. Role of electronic media in the adoption of agricultural technologies by farmers in the central Punjab-Pakistan. Int J Agri Biol, (2003); 5(1): 22-25.

[14] Annor-Frempong F, Kwarteng J, Agunga R, Zinnah MM. Challenges and prospects of infusing information communication technologies (ICTs) in extension for agricultural and rural development in Ghana; 2006. pp. 36-46.

[15] Hashemi ZH, Rad GP, Chizari M. Factors Influencing the Use of and Attitude of using Information and Communication Technologies (ICTs) in Agricultural Extension, a Study in the Isfahan Province of Iran. International Journal of Agricultural Management and Development, (2014); 4(1): 51-60.

[16] Asenso-Okyere K, Mekonnen DA. The importance of ICTs in the provision of information for improving agricultural productivity and rural incomes in Africa. African Human Development Report UNDP Sponsored research Series, (2012).

[17] Veeraraghavan R, Yasodhar N, Toyama K. Warana unwired: Replacing PCs with mobile phones in a rural sugarcane cooperative; 2007. IEEE. pp. 1-10.

[18] Irfan M, Muhammad S, Khan GA, Asif M. Role of mass media in the dissemination of agricultural technologies among farmers. International Journal of Agriculture and Biology (Pakistan), (2006).

[19] Chhachhar AR, Hassan MS, Haq I, Omar SZ. Television Viewing Habits Among Farmers in Pakistan. J Basic Appl Sci Res, (2012); 2(11): 11004-11008.

[20] Zia A, Khan A. Media Coverage For Development Of Agriculture Sector: An Analytical Study Of Television Channels In Pakistan. Journal of Agricultural Research, (2012); 50(4).

[21] Aker JC. Dial "A" for agriculture: a review of information and communication technologies for

agricultural extension in developing countries. Agricultural Economics, (2011); 42(6): 631-647.

[22] Deloitte. E-Transform Africa: Agriculture Sector Study: Sector Assessment and opportunities for ICT,. (2012); 101-111.

[23] Wims P. ICTs in Irish Agriculture: Can ICTs Improve Communication Between Agribusiness and Farmers?; 2011. pp. 103-119.

[24] Mittal S, Gandhi S, Tripathi G Socio-economic impact of mobile phones on Indian agriculture. Chapter: Book Name. 2010 of publication; Indian Council for Research on International Economic Relations New Delhi.

[25] Karugu W. Kenya Agricultural Commodity Exchange (KACE): Linking Small Scale Farmers to National and Regional Markets. New York, (2010).