Bangladesh Journal of Extension Education *ISSN 1011-3916*
Volume 27, No. 1&2, 2015: 81-92 *Research Article*

Farmers' Access to ICT Initiatives for Agricultural Information in Bangladesh

J. C. Pandit[1] and M. A. M. Miah[2]

Abstract

The agriculture sector of Bangladesh faces major challenges for enhancing production in a situation of dwindling natural resources necessary for production. Agricultural information is played very important role to face the challenges and to enhance the rural economic development of Bangladesh. The agriculture sector could leverage the Information and Communication Technologies (ICTs) to disseminate the right information at the right time and at right place. The cost factor in traditional information dissemination system and the difficulties in reaching the target people have necessitated the introduction of ICT in agriculture. Different organizations have launched a number of initiatives for dissemination of agricultural information. This paper provides an overview of some initiatives those utilize ICT in delivering agricultural information. The aim of this paper is to discuss the influence of ICT initiatives in disseminating agriculture information to the rural farmers. Finally, the article discussed the challenges and opportunities of ICT initiatives for agricultural development in Bangladesh. The findings of this article could be useful to the policy makers and entrepreneurs to launch future initiatives.

Keywords*: Agriculture, information, farmer, ICT initiatives*

Introduction

The economy of Bangladesh mainly depends on agriculture. Feeding the increasing population of the country from the gradual decreasing arable land is a great challenge. Agriculture is important sector and key contributor to the national GDP of Bangladesh. Around 20.60% of the total GDP of the country comes from the agriculture sector. But most of the farmers of Bangladesh are still in lack of modern agricultural knowledge. Farmers need to access updated information of agriculture and others which put them in better position in economic activities.

The agricultural system of Bangladesh has a long history of coping with the challenges. Agricultural technologies generated by agricultural research institutes are now being disseminated to the farmers by the Agricultural Extension Agencies. At present, the ratio of the farm families to the agriculture extension agent is very low. Although the village level extension workers disseminate information they hardly accept any accountability. These two issues have created the urgency to help and guide the poor farmers properly. The cost factor in face to face information dissemination at the right time and the difficulties in reaching the target people have also created the urgency to introduce ICT initiatives for disseminating agricultural information to the rural farmers. (Kashem *et. al.,* 2010).

Globally, the development of ICT has proven its potentials for enhancing development efforts and also virtually reduced the distance and turned the world into a global village (O'Farrell, 2003). The proposed National ICT Policy 2008 of

[1]Regional Coordinator, Integrated Farm Management Component (IFMC), Department of Agriculture and Extension, Mymensingh Region, Bangladesh and [2]Professor, Department of Agriculture Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh

Bangladesh stated that ICT is one of the most important tools to achieve economic prosperity of a country through improving the management and efficiency in every sphere of life.

Information and Communication Technologies (ICTs) are recognized as a powerful tool for socio-economic development with appropriate policies, supplemented by realistic strategies, ICTs are known to have brought tremendous welfare to farmer in terms of better access to information enhanced production and diversification of economic opportunities. The use of ICT technologies for disseminating agricultural information has been proved to be useful for enhancement of production. Philipino farmers increased rice production having easy access to ICT based information through Cyber Village Project to change their socio-economic status and improve livelihoods and living standards (Anonymous, 2014).

Nowadays, Information and Communication are considered important factors in agricultural development. People that are engaged in crop and livestock sector always sought information from each another; which is the best method to feed a cattle, how can I buy improved seeds, how can I get information about my land, what data can I find to make my crop more productive, where can I find customers for my products and what are the best prices for them are some of the queries that occur in agricultural production. ICT can offer valuable solution to many of these problems and can provide an incredible potential to improve agricultural sector both in developed and developing countries. (Salampasis and Theodoridis, 2013).

So, it is very important to take ICT initiatives to provide agricultural information to the farmers of digitally divided areas of Bangladesh in an effective way. A number ICT Initiatives so far launched in Bangladesh by different public and private organizations. The main focus of the paper is to explore the initiatives have been undertaken by various organizations (public and private) in supplying demand-led information to the farmers.

Farmers need of information: Information is an important resource for the progress of an individual and that of a nation. Access to right kind of information and possession of correct and relevant information resolves various problems faced by individuals. Information plays a significant role in removing hurdles of development. Lack of access to the right information at the right time deprives the rural people their right to development (Kumarsena and Chitra, 2003). However, information needs of the rural people depend on their occupation and basic survival needs.

Nowadays, information is a basic necessity of everyday life. For anything and everything information is needed. Information can be obtained or retrieved from a variety of sources. Farmers' constitute a particular group of users whose information need is very specific. Several studies revealed that majority of the farmers requires daily information for various agricultural works.

The present age has been rightly called information age. Information has been described as the fifth need of man ranking after air, water food and shelter (Bachhav, 2012). In agriculture environment, relevant and timely information helps farmers' community to take right decision to sustained growth of agricultural activity. Use of information in agriculture sector in enhancing farming productivity is in a number of ways. Providing information on weather trends, best practices in farming and timely access to market information helps farmer to make correct decision about

where to buy inputs, what crops to plant and where to sell their products.

Information need of rural farmers have been overviewed by different studies. Saravan *et al*. (2009) carried a study on information pattern and information need of the tribal farmers in Arunachal Prodesh in India indicated that most of the farmers need information on various topics such as pest management, disease management etc. Tolongbonse *et al*. (2008) carried a study on information need of rice farmers community in Niger disclosed that majority of the farmers need information about the crop production. In a study Hasan *et al*. (2009) found that rural people of Bangladesh wanted information mostly on different aspects of agriculture from the information centers. Similar observation was made by Akanda and Roknuzzaman (2012) in a survey in northern regions of Bangladesh. They showed that farmers need of information in various purposes of agricultural activities and they use different sources and media for access to such information. Therefore, information is a powerful tool in addressing the agricultural needs and if it is used properly it could be change nations economy.

Need of ICT in agriculture: Information and Communication Technology (ICT) is often used as an extended synonym for information technology (IT), but is a more specific term that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information (Salampasis and Theodoridis, 2013).

A new concept about Agricultural informatics has arisen following the rapid development in ICTs and of the internet. Referred to as e-agriculture, agricultural informatics is an emerging field which combines the advances in agricultural informatics, agricultural development and entrepreneurship to provide better agricultural services, enhanced technology dissemination and information delivery through the advances in ICT and the internet (Qaisar, *et al*, 2011)

Since more than half of our population is employed in agriculture, our planner should put ICT to good use in agriculture. For example, India has led the use of remote sensing satellite information for locating irrigation projects. The internet has been effectively used in some of the villages to ensure effective dissemination of agricultural commodity price information. The National Dairy Development Board (NDDB) in India has used IT effectively to enhance competitiveness of the dairy industry and to provide benefits to the rural masses. Towards digital Bangladesh we can use the Indian experience of using ICT in different sectors of the agriculture (Alam, 2015b).

ICT is an integration of the technologies and the process to distribute and communicate the desired information to the target people and making the target people more participative in nature. Use of ICT leads the farmers to quick access of information on soil & soil health, seed & crop, fertilizer & nutrients, pest & pesticides, production and management techniques, irrigation & drainage, weather and climate, organic agriculture, post harvest technique, storage & preservation, processing and safe use, marketing, credit, farmers demand driven information and technology. Use of ICT can help in

- quickest dissemination of agricultural technology.
- getting demand driven agriculture suggestion

- farmers can get appropriate solution from the concern expert direct from the field
- Improve agricultural production technology can get from multidimensional sectors
- production cost become less so getting maximum benefit/profit/income

The role of ICTs in enhancing progress towards sustainable livelihoods of the rural farmers cannot be overlooked. The Agriculture sector which is a major source of livelihood for the majority of the rural mass faces numerous challenges such as delayed input delivery, lack of markets for alternative crops, almost non-existent extension services among others. ICTs have the potential to increase learning, knowledge sharing and networking among farmers and between farmers and experts to increase productivity, sustainable livelihoods and poverty reduction (Kiefer, 2015).

The use of ICT platforms and tools can create opportunities for the poor and marginalized communities to engage with each other as well as with experts and policy makers to address some of these challenges thereby enhancing the sustainable agriculture industry towards sustainable poverty eradication. Moreover, use of ICT in agricultural can play a vital role on rural farmers' in multidimensional ways.

Capacity building of farmers: Rural farmers can be helped through the use of ICTs to strengthen their own capacity when negotiating input and output prices. Use of ICT also enables rural communities to interact with other stakeholders, thus reducing social isolation. It widens the perspective of local communities in terms of national or global developments, opens up new business opportunities and allows easier contact with friends and relatives.

It is evident that ICTs have played a major role in providing services to various stakeholders from supply-chain agents to consumers. The e-*Choupal* system in India is one of the commonly cited examples showcasing the potential of ICT in empowering the disorganized small-scale, agri-producers.

Enhancing farm production: Farm size of Bangladeshi farmers' are extremely small and cultivation depends on uncertainty due to climate change and variable weather. Increasing the efficiency, productivity and sustainability of small scale farms is an area where ICT can make a significant contribution through disseminating demand-led information in time. At the firm level, information promotes the efficiency and effectiveness of production.

Enhancing market access: The contribution of information and knowledge in bringing about social and economic development has been well recognized globally. Availability of markets and market information gives farmers the potential to bargain and improve their incomes, to seize market opportunities through the adjustment of production plans and better allocation of production factors, and also to use the information to make choices about marketing. The development and use of ICTs are playing a critical role in this regard.

Awareness of up to date market information on prices for commodities, inputs and consumer trends can improve farmers' livelihood sustainability and have a dramatic impact on their negotiating position. Such information is instrumental in making decisions about future crops and commodities and about the best time and place to sell and buy goods. In India the private sector-led Agriwatch and e-*Choupal*

programme support several millions farmers with price information.

Increased information flow has a positive effect on the agricultural sector and individual firms. However, collecting and disseminating information is often difficult and costly. Information and communication technologies (ICTs) offer the ability to increase the amount of information provided to all stakeholders in the agricultural sector and to decrease the cost and time of disseminating the information.

ICT initiatives in Agriculture: Different Government and private organizations have launched a number of ICT initiatives for dissemination of agricultural information to farmers. Some of them are only research purposed and some are direct implementation. A few of those initiatives are outlined below:

e-Kriskok: Agricultural service of Bangladesh Institute of ICT in Development (BIID) is branded as e-Krishok. BIID launched the e-Krishok initiative in 2008 in collaboration with Katalyst (a multi donor development initiative) and Grameen Phone (a leading telecom operator) with the aim to bridge the information gap that exists in the agriculture sector and build awareness and capacity of farmers to use ICT-enabled information and advisory services. e-Krishok offers information and advisory service through mobile phones (call back and SMS) and e-mail. All information is sourced from the government and private sectors. e-Krishok collates and disseminates this directly to the enlisted farmers. Through the 'Push Pull' service, farmers receive two SMS message on a particular topic they request, at a cost of US$ 0.03 per SMS. A second service enables farmers to receive a call from a BIID information officer to respond to their immediate needs (US$0.07 per minute), and four SMS messages, containing relevant information about the topic in question (BIID, 2012). By 2010 e-Krishok has enlisted over 15000 farmers and provided information and advice on crop, fisheries and livestock to 8000 farmers. To link farmers with the service and act as an interface between farmers and the technology, BIID has a team of 'Business Promoters' (BP). BP send farmers quarried via e-mail or link farmers directly to BIID agriculture experts over the phone (BIID, 2015).

e-Information Short Code 16250: BIID introduced the short code-based Help Line 16250,

a new service to offer e-information dedicated to providing information covering a wide range of areas including agriculture ensuring people's right to information at the right time (BIID, 2015). The service is available to Grameen Phone customers and farmers can enjoy call back and SMS-based advisory services.

Zero Cost Model: The `Zero Cost' extension model has been developed by BIID which is a business model for extension and advisory service (EAS) to serve small holder farmers through private sector partners powered by ICT. It is a model which will facilitate free extension related information and advisory services for the farmers which will be bundled with inputs packages. Every farmer who buys an input package is entitled to receive an information service package whose value will depend on the value of products (BIID, 2015). The model is commercially launched by BIID in collaboration with BRAC, ACI, Mallika Seed and Kishan Agro.

Bangladesh *Krishi Gigyasha* 7676: Banglalink (the second largest mobile phone operator in Bangladesh) pioneered to launch the unique service called Banglalink *Khrshi Jigyasha* 7676 in 2009 in collaboration with Katalyst. *Jigyasha* 7676 is accessible to anyone from any part of

Bangladesh using a Banglalink connection. Presently, the helpline provides information on 67 agricultural sub-sectors and serves about 25000 farmers per month. The information database is updated on a regular basis with collected, collated and validated content from reliable and authentic sources. It is reported that around 90% of the callers are satisfied with the information received for solution suggested to their problems (Jalil, 2009). In recognition of the farmers satisfaction Banglalink Jigyasha 7676 won GSMA Asia Mobile Awards in 2009. Since 2011 Banlalink launched another helpline 2474 to provide market information to the farmers i.e., where to sell produces and where to buy inputs.

e-Purjee: e-Purjee, Digital purchase order for sugarcane farmers, is a SMS based purchased order that sugar mills all over the country send to sugarcane growers during crushing season. Formally known as Digital Sugarcane Procurement System, this new system promises timely delivery of purchase orders to farmers. This reduces uncertainty of the previous paper-based system by enabling farmers with timely delivery of sugarcane to the mills benefiting farmers and sugar mills alike. With advisory and technical support from the Access to Information (a2i) Programme, Sugar and Food Industries Corporation is running the e-Purjee system in all 15 state owned sugar mills of Bangladesh since 2011-12 crushing season. For implementing e-Purjee, a2i has partnered with Bangladesh Sugar and Food Industries Corporation, Ministry of Industries and all 15 sugar mills.

The initiative has demonstrated to deliver the right information at the right time to the right people; and to minimize opportunities for corruption by reducing 'touch points'. e-Purjee brought empowerment through better flow of information. It increased transparency in the sugarcane procurement process by giving all farmers a fair chance in procurement. For sugar mills, e-Purjee system improved efficiency by streamlining the procurement process; ensuring procurement of high quality sugarcane by maintain timing as well as proper supply.

Krishi Call Center 16123: *Krishi* Call Center is an initiative of Practical Action and Agriculture Information Service working with the Ministry of Agriculture. The call center was launched in June 2014. It offers real-time advice on farming issues in Bangladesh. From Bangladesh any farmer can call to 16123 during office time from any mobile operator free of charge for help with any problem related to production in agriculture, livestock and fisheries. Agricultural experts from the centre are providing immediate and effective solution to the problems of the farmers which help them to overcome their problems. However, from March 2015 call charge @ Tk 0.25 per minute was imposed.

Grameen Phone Community Information Center (GPCIC): Grameen Phone launched the initiative Community Information Center (GP-CIC) in 2006 in collaboration with Katalyst to provide information and advisory service to the rural community on different aspects of their daily life including agriculture. So far 500 centers are working throughout the country. BIID was also engaged in the process to build the capacity of the CIC entrepreneurs to provide better services. In a study on service delivery of CICs Islam and Hoq (2010) reported that in terms of the types of information sought, CICs provided various aspects of information to the rural community among them information on agriculture (90%) was the highest followed by market prices (67%) and health (46.6%).

Krishi Projukti Bhandar: BARI Application or *Krishi Projukti Bhandar* is an initiative of Bangladesh Agricultural

Research Institute (BARI). Basically it is a BARI developed technology based mobile phone application. It is designed through incorporating all technologies developed by BARI. Android based mobile phone users can use this app downloading from Google Play Station as 'BARI Application'. Smart phone users can get information online by browsing through their phone sets from 'baritechnoloty.org/m'. Through this app one can get information on production technology, pest management, fertilizer management etc. of different crops. If needed users can put their quarries for more information and get back reply through SMS and e-mail.

Bangladesh Rice Knowledge Bank (BRKB): BRKB is an initiative of Bangladesh Rice Research Institute (BRRI). It can be used through online and offline platform. It is a treasure of rice knowledge. It is a dynamic source of knowledge updated regularly to keep consistency with the latest innovations and users' feedback. The BRKB contains rice knowledge to address the regional as well as national issues associated with rice production and training. Most of the materials i.e. fact sheets, training manuals, booklets, leaflets, brochures, posters, videos, have been prepared in Bangla, which are easy understandable to farmers and extension workers. Senior scientists of Bangladesh Rice Research Institute (BRRI) have been prepared the contents of fact sheets and other training and communications materials. The extension service providers are the immediate beneficiaries of the BRKB. However, ultimately farmers will be benefited from it.

Online Fertilizer Recommendation System (OFRS): It is an initiative of Soil Resource Development Institute (SRDI). SRDI in collaboration with KATALYST launched smart web based software named Online Fertilizer Recommendation System (OFRS) in September 2009 to provide quick fertilizer recommendation service to farmers. Initially the service was confined to 30 Upazillas however, form 2014 it covers all the Upazilas of the country.

OFRS helps to generate location specific fertilizer recommendation for selected crops analyzing the national nutrient database. The software needs only location and land type information to generate crop specific fertilizer recommendation. OFRS can provide the farmers with recommendations on the use of optimum combination of fertilizers for their crops. The software is user friendly. Computer and internet user can provide the service. Technical knowledge on soil fertility and fertilizer management is not necessary. Users can get this service directly by logging on www.frs-bd.com or www.srdi.gov.bd and then clicking OFRS. Katalyst also promoted the widespread use of the software and facilitated organizing trainings and hands-on demonstration to different extension agents who are responsible for delivering need-based agriculture extension services to the farmers.

Agriculture Information and Communication Center (AICC): AICC is an initiative of Agriculture Information Service (AIS). It is a community level information center. Selected farmers clubs of rural areas were developed as AICC through equipped with ICT tools and capacity building of some selected members. So far AIS established 245 AICC though out the country. The idea of establishing AICC at the village level has derived from the thinking where demand-led agricultural technology and information will be available at the door-step of the farmers so that the rural people can get the benefit from it and can improve their livelihood. AICC sheds a new light into the

conventional information delivery mechanism. Providing appropriate information and communication tools to these information centers could potentially enhance and improve the efficiency and effectiveness of service and information delivery to a great extent (Alam, 2015a). Average 50 farmers per day are getting benefit from those centers. Moreover, through AICC rural farmers can actively participate in the farm telecast and farm broadcast programmes by phone-in-programme to get their desired information.

Pollitathya: Development Research Network popularly known as D.Net, a multidisciplinary non-government research organization, promotes development through use of Information and Communication Technology (ICT) all over the country. In 2003 D.Net first opened ICT-based information and knowledge center, called *Pallitathya Kendra* (village information center) with holistic service approach towards development. *Pallitathya Kendra* is one of the five components of *Pollitathya* Model of D.Net.

Pallitathya Kendra is a common access point at the community equipped with different ICTs equipments to ensure access to information for the rural people. Community beneficiaries would not have to own ICT tools, as they can come to a common access point and use ICTs free of cost or for a small fee, with the help of an ICT literate person if necessary. Generally *Pallitathya Kendra* is established at a cross-section of roads and closer to public gathering place so that community beneficiaries can visit *Pallitathya Kendra* conveniently.

Helpline is another component of *Pollitathya* Model of D.Net. In 2004 D.Net started helpline supported by GKP (Global Knowledge Partnership). Helpline is a mobile phone based call centre which provides experts' opinion and advice to the grass-roots people at the point of their need. Helpline is operated through the *mobile lady* who connects the villagers with the experts' pool using mobile phone. Generally, a female information worker called *mobile lady* goes door to door in rural area to assist the community beneficiaries in asking their livelihood related queries using the mobile phone to the Help Desk where experts, in different fields including agriculture, answer those questions. The integration of help line services with content based information and knowledge services made the *Pallitathya Kendra* more effective. When answer to a particular question was not available in the *Pallitathya Kendra* content base, one can use the help line to get answer to that using help of subject matter expert. This combination of centre-based content and help line allowed to implement 'no refusal policy'.

Websites: A website, also written as web site is a set of related web pages typically served from a single web domain. A website is hosted on at least one web server, accessible via a network such as the Internet or a private local area network through an Internet address known as a uniform resource locator (URL). All publicly accessible websites collectively constitute the World Wide Web (www).

So far a number of websites are hosted in the country by different Government and private organizations. All the NARS institutes also have their own websites. Through their websites they are providing information on different aspects of agriculture. It includes textual, audio, video, graphics, and many other forms of content. Some notable websites are www.moa.gov.bd, www.ais.gov.bd, www.dae.gov.bd, www.dls.gov.bd, www.dam.gov.bd, www.barc.gov.bd, www.bari.gov.bd, www.brri.gov.bd,

www.bina.gov.bd, www.bfri.gov.bd, www.badc.gov.bd, www.ekrishok.com , www.krishibangla.com, www.agrobangla.com and many others.

In respect of farmers access to websites it is observed that most of the farmers are not able to read. So, websites are not useful for them. They want to get information through direct calling (Ahmed, 2015).

In recent years farmers attitude to access to agricultural information have been changed because of very fast networking of information and communication technology, especially due to extension of mobile phone network. It has been reported that 84% rural farmer use mobile phones, 67% farm families use more than one mobile phones and 73% farm families use more than one SIMs . It has also been reported that farmers seek information through the helpline of mobile phone mostly regarding pest management of crops (67%), next regarding cultivation techniques (10%) and fertilizer (7%), seed (2%) and other issues (14%) (Katalyst, 2013). In a study on farmers' access to 8 selected rural ICT centers in Bangladesh revealed that users of ICT services vary according to their age and literacy level. Maximum ICT service users were up to 30 years of age and the education level of highest users was higher secondary level. It is also revealed that most of the respondents opined to get agricultural information from the information centers. The study was found that information centers were able to bridging the digital gap and provide access to information for the social mobilization and development (Hasan *et al.*, 2009).

So, it is possible to serve almost all the farmers of the country through the use of ICT. By using ICT, so far about 7,45,000 farm families were benefited and per capita income increased in an average Tk. 10,500 (Katalyst, 2013). So, it is revealed that farmers' access to ICT exerts a great influence in enhancing their livelihood.

It is reported that there is a positive impact of different rural information centers for the livelihood development of the poor in Bangladesh. Especially the initiatives of D.Net and YPSA are remarkable in this respect (Hasan *et al*., 2009)

Challenges of farmers' access to ICT initiatives: In agriculture, relevant and timely information helps farmers to take right decision. Though it is evident that ICT initiatives in Bangladesh have a great influence on farmers' livelihood improvement, still there are some challenges need to be addressed to foster farmers' access to ICT initiatives. Some of them are mentioned below:

Awareness: Awareness is precondition for access to a service. Awareness in terms of cost and mode of service delivery both are very important. Majority of the farmers are not aware about the ICT initiatives in agriculture.

Sustainability: Sustainability is crucial factor for ICT initiatives in Bangladesh. Most of the ICT initiatives launched by different organizations with the (financial and/or technical) assistance from one or more development partners. While funding by development partners is ceased entrepreneurs not continue their services. Discontinue of initiatives exerts a negative impact on farmers access to ICT initiatives.

Validity: Validity of information is very vital issue to the farmers. The information which would be disseminated to the farming community must be valid. Entrepreneurs collect information from different sources which are not always validated by the competent agency. So, all entrepreneurs should use information from a common source. For that, there should be a national repository which would be managed and

updated by the concerned departments of the government.

Credibility: Credibility can be simply understood as "believable". For instance, credible information can be understood as believable information. Two aspects are highlighted in constructing credibility; one is trustworthiness, and another is expertise. Within the context of these two aspects, sources which are truthful and unbiased are typically trusted and perceived as credible by the receiver. Similarly, sources from knowledgeable, skilful and competent people are also considered credible (Obidike, 2011). Credibility of information sources affects the adoption of improved agricultural practices by farmers. Credibility refers to perceived trustworthiness and expertise accorded to a source by its users at any given time. Farmers rely mostly on government information. So, government affiliation is needed so that farmers can use information without hesitation. Therefore, sources of agricultural information play major role in diffusion of agricultural innovations.

Accessibility: Easy to access encourages farmers to use the ICT services. The ICT initiatives so far launched by different entrepreneurs most of them are not farmer friendly. To extend the benefits of ICTs to majority of the farming community, initiatives should be made ease to access by the rural farmers. The rapid spread of mobile phone coverage throughout the country provides a unique opportunity to entrepreneurs to give emphasis on mobile phone based initiatives. However, multiple options should be there.

Demand-led: All most all the ICT centers provide directory based information to the farmers. Often farmers do not get desired information which they sought. So, to provide demand-led information to the farmer, contents should be updated on a regular basis and subject matter specialist should be there to meet up the farmers' additional quarries.

Affordability: Cost of access to information is a major concern for the rural farmers. So, farmers' access to agricultural information through ICT initiatives should be free of cost or easily affordable by them. However, none of the ICT initiatives so far launched is free of cost even some are expensive.

Language: Studies on different internet contents of some information centers initiatives revealed that most of the contents were complex and difficult to understand by the rural communities (Hasan *et al.*, 2009). Farmers of some regions of Bangladesh are familiar with local language only. So, Bengali language content will make ICT more relevant and accessible to a broader cross-section of the population. Therefore, ICT contents in agriculture should be in Bangla so that farmers can easily understand. Moreover, options should be there to get information through local dialect.

Accountability: Accountability of delivered information is another crucial issue to the farmers. Because through ICT media, they receive information form an unknown person. So, accountability should be well defined while launching any initiative by the entrepreneurs.

Conclusion

Farmers' access to right information at the right time is essential for decision making and also to enhance their livelihood. So, a comprehensive model is needed to address

the limitations of existing ICT initiatives, by offering a holistic, one-stop shop information service on a variety of carefully integrated platform. Primarily, farmers should be aware about the ICT initiatives to increase their access and emphasis should be given on sustainability of the initiatives. The information provided by the entrepreneurs must be valid and credible to the farmers. Easy access to need based information should be ensured with affordable cost. Provided information should be in user friendly form preferably in local dialects. So, public-private partnership should be there for validity and credibility of information and sustainability of the initiatives. Entrepreneurs should be accountable for their services. Furthermore, incorporation of farmers' feedback and periodical evaluation of the initiatives should be ensured to enhance farmers' access to ICT initiatives.

References

Ahmed, K. 2015. Role of ICT in Agriculture Extension. Prothom Alo. July 3, 2015, p-11. Dhaka. http://epaper.prothom-alo.com/ (retrieved on October 06, 2015).

Akanda, A.K.M.E.A. and M. Roknuzzaman. 2012. Agricultural Information Literacy of Farmers in the Northern Region of Bangladesh. Information and Knowledge Management, 2(6):1-11. www.iiste.org (retrieved on September 20, 2015).

Alam, M. Z. 2015a. e-Agriculture: A new approach for agricultural development. The Guardian, April 22, 2015. Dhaka.

Alam, S.A. 2015b. Digital Bangladesh: A Prime ministers-dream Vs Understanding the Present. Association for Progressive Communications, Dhaka. https://www.apc.org/en/blog/digital-bangladesh-prime-ministers-dream-vs-unders. (retrieved on September 19, 2015)

Anonymous. 2014. ICT helps boost rice yield in Philippines. http://www.thedailystar.net/ict-helps-boost-rice-yield-in-philippines-44407 (retrieved on September 29, 2015).

Bachhav, N. V. 2012. Information needs of the rural farmers: A study from Maharashtra, India: A Survey. Library Philosophy and Practice (e-journal), Paper 866. pp.8-12. http://digitalcommons.unl.edu/libphilprac/866 (retrieved on September 29, 2015).

BIID (Bangladesh Institute of ICT in Development). 2012. e-Krishok: Promoting ICTs to farmers in Bangladesh. New Agriculturist. September 2012. Dhaka. http://www.new-ag.info/en/focus/focusItem.php?a=2779 . (retrieved on September 18, 2015).

BIID (Bangladesh Institute of ICT in Development). 2015. e-Krishok: Agricultural Information & Advisory and Market Linkage Services for Farmers. http://www.biid.org.bd/index.php?detail=activities (retrieved on September 20, 2015).

Hasan, R., S. Islam, M.S. Rahman and K.N.A. Jewel. 2009. Farmers access to information for agricultural development in Bangladesh. Bangladesh Res. Publ. J. 2(1): 319-331.

Islam, M.S. and K.M.G. Haq. 2010. Community internet access in rural areas: a study on community

information centres in Bangladesh. Malaysian J. Libr. Info. Sci. 15(2):109-124.

Jalil, M. S. 2009. Banglalink Jigyasha 7676 won GSMA Asia Mobile Awards 2009. News Issue 9, Dec 6, 2009. Katalyst. www.katalyst.com.bd/docs/newspieces/News_Issue_09.pdf (retrieved on October 15, 2015).

Kashem, M. A., M.A.A. Faroque, G.M.F. Ahmed and S.E. Bilkis. 2010. The complementary roles of information and communication technology in Bangladesh agriculture. J. Sci. Found. 8(1-2): 161-169.

Katalyst. 2013. Agar Quest Survey, Katalyst, Prothom Alo. July 3, 2015. p-11. Dhaka. http://epaper.prothom-alo.com/ (retrieved on 06 October, 2015)

Kiefer, L. 2015. ICTs for Agricultural Development: Unlocking the Potential. http://www.panos.org.zm/?p=3148 . (retrieved on September 12, 2015).

Kumarsena, S. C. and A. Chitra. 2003. A study on the need for rural information centers in the villages of Tamil Nadu. Annals of Library and Information Studies, 50(4), 137-145.

O'Farrell, C. 2003. Global trends and major issues of ICT application in agriculture. Paper presented at APO seminar on 'Information Communication Technology (ICT) for improved agricultural production and competitiveness' held in Yogyakarta, Indonesia during 8-12 Sept. 2003.

Obidike, N. A. 2011. Rural farmers' problems accessing agricultural information: A case study of Nsukka local government area of Enugu State, Nigeria. Library Philosophy and Practice. http://unllib.unl.edu/LPP/obidike.htm (retrieved on October 10, 2015).

Qaisar, T. M., M.M.A. Khan and S. Alam. 2011. Innovative agricultural information services by ICT projects in India. Intl. J. Trade, Econ. Finan. 2(4): 276-279.

Salampasis, M. and A. Theodoridis. 2013. Information and communication technology in agricultural development. Procedia Technology. 8:1-3.

Saravan. R., P. Raja and T. Sheela. 2009. Information input pattern and information need of Tribal Farmers in Arnuchal Pradesh, *Indian J. Extn. Edu.* 45 (1&2): 51-54.

Tologbonse, D.; O. Fashola and M. Obadiah. 2008. Policy Issues in Meeting Rice Farmers Agricultural Information Needs in Niger State, *J. Agril. Extn.* 12(2): 84-94.