The ICT in Agricultural Development of Bangladesh

Dr Mir Mohammad Azad, Atikul Islam Liton, Mohammed Naseer K

Abstract— **Information is a key component in improving smallholder agricultural production and linkages to remunerative markets, thus improve rural livelihoods, food security and national economies. The dynamics of using phones among farmers linking them to market outlets and other service providers are discussed. . The paper isolate strength, weakness and threats while analyzing insights associated with results patterns. The findings showed that rural communities appreciated the use of phone as easy, fast and convenient way to communicate. Phone usage was accompanied by positive outcomes and opened opportunities like strong collective action among social groups for effective natural resource management.**

Index Terms— **ICT in agricultural,ICT in rural development, agricultural Bangladesh.**

I. INTRODUCTION

Agriculture is the largest employment sector in Bangladesh. As of 2016, it employs 47% of the total labour force and comprises 16% of the country's GDP. The performance of this sector has an overwhelming impact on major macroeconomic objectives like employment generation, poverty alleviation, human resources development and security. A plurality of Bangladeshis earns their living from agriculture. Although rice and jute are the primary crops, wheat is assuming greater importance. Tea is grown in the northeast. Because of Bangladesh's fertile soil and normally ample water supply, rice can be grown and harvested three times a year in many areas. Due to a number of factors, Bangladesh's labour-intensive agriculture has achieved steady increases in food grain production despite the often unfavorable weather conditions. These include better flood control and irrigation, a generally more efficient use of fertilizers, and the establishment of better distribution and rural credit networks. With 35.8 million metric tons produced in 2000, rice is Bangladesh's principal crop. National sales of the classes of insecticide used on rice, including granular carbofuran, synthetic pyrethroids, and malathion exceeded 13,000 tons of formulated product in 2003. The insecticides not only represent an environmental threat, but are a significant expenditure to poor rice farmers. The Bangladesh Rice Research Institute is working with various NGOs and international organizations to reduce insecticide use in rice. In comparison to rice, wheat output in 1999 was 1.9 million metric tons. Population pressure continues to place a severe burden on productive capacity, creating a food deficit, especially of wheat. Foreign assistance and commercial imports fill the gap. Underemployment remains a serious

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problem, and a growing concern for Bangladesh's agricultural sector will be its ability to absorb additional manpower. Finding alternative sources of employment will continue to be a daunting problem for future governments, particularly with the increasing numbers of landless peasants who already account for about half the rural labour force.

II. HISTORY

The **ICT** (Information and Communication Technology) use in the Agriculture of Bangladesh is not so rich. In 2003, Support to ICT, task force program launched by the Ministry of Agriculture (**MOA BD**). In Bangladesh, private sector operators are the main providers of ICTs (mobile phones, computers and internet, television channels, radio, and fixed-line telephony on a limited scale), whereas the state controls the fixed-line telephony and two national TV channels and 10 radio centers. The government also formulates and implements ICT policy.

III. NEED OF ICT IN AGRICULTURE

E-agriculture helps in dissemination of gathered information to the farmers, mostly lived in rural areas, to use in their routine work (World Summit on the Information Society, Geneva 2003). These services are provided and enhanced through the Internet and related technologies. This ensures the effective and efficient use of information and communication technologies for analyzing, designing and implementing existing and innovative applications to help the agricultural sector. The information disseminated by e-Agriculture can be divided into several major areas, which is called as services of e- Agriculture (Panchatopa D. and Karmakar C. K. 2006). These are:

- ✓ Weather Information
- ✓ Production and Cultivation Techniques
- ✓ Diseases and Insect Information
- ✓ Plant Nutrients and Water Usage
- ✓ Price Information
- ✓ Demands and Current Stock Information
- ✓ Educations and Health Information
- ✓ Government and Non-government Facilities

Among the above services the first five are directly connected with the production system. To establish e-Agriculture, the use of database to store agricultural information that varies according to geographic condition, and use of both Local Based Service (LBS) and Internet to disseminate information through both wired and wireless technology.At present, the ratio of the farm families to the extension agent is 1000:1, which is really very less (NAEP, 1996). Although the appointed Village Local Workers (VLWs) disseminate the 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 audiences, has also

created the urgency to introduce ICT. It is only by the introduction of ICT that information can also be upgraded at the least cost.

IV. RECOGNITION OF DIFFERENT ORGANIZATION

The majority of Bangladeshi and international NGOs working with ICTs are now developing community information centers in the country to facilitate information transmittal to the rural people. Some NGOs partners with private organizations or local government include- **Gonokendras** of **BRAC**, **D.NET-Pallitathaya Kendra**, **GP-Communication Information Center**, **RDA** (Bogra), **Dam** (Gonokendra), **Ghat-Rural ICT Center**, **YCMC** (Youth Community Multimedia Center), **RTC** of Practical Action, **Amader Gram** of **BEFS** , **BNNRC**, **Bangladesh Computer Council**, **AIS** of the Ministry of Agriculture, **Hridoye Mati o Manush** by Channel–I and **Coast Bangladesh** etc.

Recognizing the role that information can play in improving the livelihoods of the poor, NGOs began to look at tele-centers as a means of information sharing. In Bangladesh, telecentre development has been spearheaded by Grameenphone, Amader Gram and the Society for Economic and Basic Advancement (SEBA). Later, BRAC (the Bangladesh Rural Advancement Committee) set up community learning centers (Gono Kendra) throughout Bangladesh, and Grameenphone has set up a Community Information Centre (GPCIC) in each Upazilla (Thana). A D.Net project has stressed the importance of livelihoods content in local dialects and has developed a content compendium and tested the impact of this among villagers through Pallitathya Kendra (Rural Information Centers) in four districts in 2005. While implementing, they found it most challenging to understand the problems related to Agricultural Information of rural people. Recently Agricultural Information Service has piloted 10 farmers community based Call Centers in rural areas. The Department of Agricultural Marketing (**DAM**) with support from the Food and Agriculture Organization (**FAO**) has been working together to make agricultural market information available. Mobiles are increasingly being used in rural villages. Grameen's Village Phone Project has helped expand the rural mobile base. There are presently more than 122,000 village cell phone women who have the potential to connect poor farmers to a market price information system. Mobile phones an alternative for both data collection and dissemination. There is a great dissatisfaction with prices and market information, in particular among farmers. 80 % of farmers say they would go to some other market to sell if prices were better there, and almost 60 % say they would use mobile phones to get such information (Islam and Gronlund, 2007). The system provides full awareness of all parties of prevailing market prices. Another mobile operating company Banglalink launched a new e-service for the farmers 'Banglalink Jigyasa 7676' which will provide suggestions and answers to any queries related to agriculture, vegetables and fruit farming, poultry, livestock, fisheries etc. The service will give people with easy access to advice and solutions to agriculture-related problems. To avail the service a **Banglalink** customer needs to dial 7676, talk and get expert's advice on the problem.

V. IMPACT IN RURAL ECONOMY AND SOCIAL MARKET

ICTs can improve the quality and availability of public and private services to the rural poor of the country. Benefits arise from reorientation of the service provision from the supply to the demand side, making it more responsive to the needs of the rural poor. ICTs allow services to be delivered to a large number of people at low variable costs, with consequent efficiency gains in service provision. ICTs increase the timely and transparent flow of information between service providers and the users. This strengthens the ability of service providers to swiftly respond to the needs of the rural poor and of service users to demand the services they need and to monitor service delivery.

The economy of **Bangladesh** is mainly agricultural. Agriculture is the largest sector in Bangladesh, comprising almost 80% people's involvement by contributing 21-23% of the GDP. About 80 percent of the total population lives in rural areas, and 62 percent of them are directly, and others are indirectly engaged in a wide range of agricultural activities.

Nuclear Agriculture has brought a new dynamic change in the agricultural sectors of Bangladesh. This grand success has mainly been brought by the farmers through using modern technologies developed by research organizations and effective Agricultural Extension Services of the Department of Agricultural Extension (DAE).

The Department of Agricultural Marketing (DAM) of the Ministry of Agriculture, Government of Bangladesh has undertaken an e-government initiative that would utilize the power of ICT to develop and disseminate critical Agricultural Market Information to farmers, traders, government, policy makers, development agencies and other stakeholders.

Several E-Commerce sites like amardeshshop.com, bikroy.com, cellbazar.com in Bangladesh normally offers various items for sale, recently they have added animals (cattle) to the list in the Eid-ul-Azha 2013. Farmers got direct benefit using these sites, buyers were able to make direct conversation with the owners / farmers.

Another E-Commerce website has recently launched in Bangladesh named as lamudi.com.bd, where people can sell and buy their House / Plots / Flats / land properties. Land Owners / Farmers of the country can get benefited from this site if they want to sell their land or they can search for new one to buy. In lamudi.com.bd, sellers can easily create an account, can list their property and can provide the details descriptions such as size, price, facilities, area description, can include the picture of the property.

Various govt. and Non-Govt. organization in Bangladesh has started providing information's, advisory service through mobile phone (IVR / Call / SMS based). An example of this kind of website is ekrishok.com. The Bangladesh Institute of ICT in Development (**BIID**), in collaboration with Katalyst (a multi donor development initiative) and Grameen Phone (telecom operator) has launched the e-Krishok initiative in 2008. E-Krishok build the awareness and capacity of farmers of Bangladesh to use ICT-enabled information and advisory services.

Bangladesh has stepped into new era of Digital World with a spectacular vision for making Digital Bangladesh. This vision would be saddled by E-Agriculture involving multidisciplinary initiatives of Agricultural Informatics, Agricultural Development and Entrepreneurship towards building an Efficient and Resourceful Bangladesh.

VI. ICT AND ITS CURRENT STATUS IN AGRICULTURE

ICT is an integration of the technologies and the processes to distribute and communicate the desired information to the target audience and making the target audience more participative in nature. ICT is used in agriculture through E format. Food and Agriculture Organization (FAO) defines – "e-Agriculture" as an emerging field, which combines agricultural informatics, agriculture development and entrepreneurship (FAO website). E-Agriculture is not a new concept in Bangladesh. Both government and private organizations have taken initiatives for implementation of ICT in agriculture throughout the country. Some of them were only research purposed and some are direct implementation. But unfortunately it's not satisfactory up to the time country. In 2003, under the "Support to ICT" taskforce program the ministry of agriculture of Bangladesh did set up an agricultural information system. At initial this system used the data of 10 different districts of Bangladesh for collecting and disseminating the information of the products produced by the different agricultural sectors. But it was incompatible for extension due to traditional database (Computer Jagat, 2004). In 2005, a group of researchers of D.Net (Development Research Network, Bangladesh) proposed the idea of "Pallitathya Help Center" and conducted a project on it. The idea centred on the use of relatively less fashionable ICT, the mobile phone, as an effective 'last mile solution' to improve access to livelihood information for the rural people. They found it most challenging to understand the problems (related to health, agricultural, weather information) of rural people and to provide the appropriate information (Raihan A. et. al., 2005). The application of Geographic Information System (GIS) as a computer assisted spatial information system in Bangladesh started more than a decade ago in early 1990s. There are about 30 GIS installation in the country so far but GIS installations in different organizations work with their specific mandates. Still the farmers are not getting the modern agricultural information when needed. Recently Grameen Phone, Banglalink and Robi established call centre, provided agriculture information through their large mobile network to all over the country for target people.

VII. THE DEPARTMENT OF AGRICULTURAL MARKETING (DAM)

Based on the information's provided on the web portal The DAM is under the Ministry of Agriculture, **Government of Bangladesh** has undertaken an e-government initiative that would utilize the power of ICT to develop and disseminate critical agricultural market information to farmers, traders, government, policy makers, development agencies and other stakeholders.

Under the overall coordination and support of the Government's **Support to ICT Task Force**, DAM has developed the first phase of its programme to automate data entry at the district level where market information of agricultural products is collected from local markets.

The initiative also attempts at developing the capacity of the DAM head office in Dhaka City to consolidate and coordinate dissemination of the information to **government, farmers**, and other **stakeholders**.

The web enabled information system would make a significant contribution to DAM's effort to collect and disseminate updated information on agricultural market prices on a daily basis. Additionally, the information system would enable the DAM to undertake extensive analysis of market behaviour and pattern of agricultural products that would be of considerable value to government policy makers and other users.

The Department of Agriculture Marketing (DAM) will strive to continuously refine and update relevant information and analysis generated from its market information system. Concurrently, it will upgrade the technology drivers of its information system to provide for greater coverage and appropriate dissemination of agricultural market inform.

For more information about DAM and to know daily prices for agro based products please visit **DAM** web portal.

VIII. ICT AND ITS CHALLENGE IN AGRICULTURE

It is very important that the application of ICT in agriculture is increasing. E- Agriculture helps in dissemination of gathered information to the farmers, mostly lived in rural areas, to use in their routine work. These services are provided and enhanced through the Internet and related technologies. This ensures the effective and efficient use of information and communication technologies for analyzing, designing and implementing existing and innovative applications to help the agricultural sector.Those who are involved with agricultural industry also need information and knowledge to manage their occupation efficiently. Any system applied for getting information and knowledge for making decisions in any industry should deliver accurate, complete, concise information in time or on time. The information provided by the system must be in user-friendly form, easy to access, cost-effective and well protected from unauthorized accesses. An important role could be played by ICT in maintaining the above mentioned properties of information.

An authentic agricultural database based on soil and climate condition, crop cultivation history, farmers interest, demand of raw material, pest and disease management technologies, storage facilities, marketing system, etc. have to be developed with the help of ICT and GIS (Geographic Information System). Government has prioritized quick dissemination of agricultural technologies to the farmers level. Reduction of yield gap between research and farmers field has been identified as important parameter to increase production.Number of action plans has been prepared to reduce the yield gap of the pulses, oilseed and spices. The gap between know how and do how of the knowledge based production system is being implemented through target oriented production plans. Action plans are being implemented with improved seed supply, demonstration and imparting training, coordinated by BARC and implemented

by the NARS institutes, namely BARI, BRRI, BSRI and BINA as well as DAE.Developed countries some time failed to perform their responsibility to address the problem of unfair trade and rationalizing global financial system and transferring new technologies for productive youth employment in developing countries in order to achieve MDG 8: Develop a global partnership for development. Developed countries should come forward and assist the least developed countries in exploiting potentials of international trade and should fulfill their obligation as signatories to the MDGs. It would be a huge challenge to bring together the donors and recipient countries to form an effective partnership to attain MDGs in the stipulated period.The Paris Declaration promotes partnerships that improve transparency and accountability on the use of development resources. This encourages donors and partners jointly assess mutual progress in Bangladesh in implementing agreed commitments on aid effectiveness by making the best use of local mechanisms. There needs to be infrastructural development and technology transfer throughout Bangladesh to diffuse knowledge as soon as possible to spread information and knowledge to the remote regions of the country. There are national strategies to promote ICT with the recent government vision of "Digital Bangladesh" by 2021.

IX. CONCLUSION

In this age of technology it is very difficult to compete in any form of business undertaking if one is not up to date with technological advancement. ICT in Agriculture is a tool for information generation and dissemination, its outputs is basically service- oriented in nature. However, computer and mobile network based modeling could be undertaken to provide all information for marginal users. This paper may cover both short and long-term objectives including future projections or forecasts/predictions through development of Expert Systems (ES) and Decision Support Systems (DSS) for food security. ICT should be used as a carrier of dissemination of technologies generated by the ARIs. The technology should be used as a tool for monitoring and evaluation. In order to address all the above mentioned issues activities in ICT must be institutionalized in the NARS and other organizations. Enabling conditions must be created at the Institution and at National levels.

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Dr Mir Mohammad Azad was born in Village –Korer Betka; Post Office –Mirrer Betka; Police Station -Tangail; District -Tangail, Bangladesh on 10th October, 1982.He received PhD in Computer Science, 2008 from Golden State University, Master of Computer Application, 2006 from Bharath Institute of Higher Education and Research Deemed University (Bharath University) and Bachelor of Computer Application, 2004, Bangalore University, India. He is pursuing Bachelor of Law (LL.B) from National University of Bangladesh. He was working as a lecturer and head of computer science in various colleges in Bangalore and also worked as an Assistant professor and Vice Principal in different colleges in Bangalore during the year (2005-2009).He worked as an Assistant Professor and Head of CSE & CSIT at Shanto Mariam university of Creative Technology (2010-2014). He is having 22 publications in international journal in various countries like UK, USA, FRANCE, KOREA, PAKISTAN, INDIA, GERMAN, and JAPAN. At present he is working as an Associate Profess or, Department of Computer Science and Engineering, Department Computer Science and Information Technology in Shanto Mariam university of Creative Technology, Uttara, Dhaka, Bangladesh. His areas of interest include Computer Architecture, E-commerce, Digital Image processing, Computer Network, Wireless communication, MIS and Law.

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