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ICT-based agricultural extension initiatives: A review

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Abstract

Agricultural extension delivers quality services to producers in the remote areas. Due to rapidly change of modernizing farming systems, public delivery of extension services in developing countries is sometimes perceived as superseded. The rising food prices have pushed people back into poverty. The gloable population expected to hit billion by 2050, and demand for food pressure on already fragile resources. Feeding that population will require a 70 per cent increases on food production. So that agriculture face a range of modern and serious challenge, particularly in developeing countries exposed to price shocks, climate change in rural areas. In this instance that ICT play a vital role in assisiting farmers to meed the demand for increased food production. In this context that ICTs and its plafforms play a crucial role in helping people meet the demand for increased food production. ICTs can play a very crucial role by disseminating information to farmers to help them make better well informed decisions. Through ICTs people can obtain the latest up-to-date information, learn and practice sustainable farming. It is in this regard that seven case studies have been documented in this report to understand the various unique pathways through which ICTs can play a crucial role in promoting agricultural development.

Keywords: Agricultural, extension, communication and technology

Introduction

The government rectified transformative power of technology change in delivering better efficient services and products, functioning, digitize educational records, etc. Technology enabled social security platforms play vital role in realizing the vision for India's growth (Swissnex India, 2017) [15]. Hwoever, small and marginal farmers who need relevant sustain information for improving their farm enterprises. A substantial knowledge among farmers' including information of successful farm practices, new technologies or controls of pest and disease. In India information and communication technology (ICT) (Batchelor 2002) [3]. The challenges faced by farmers like sustainability, affordability, ease of use, accessibility and availability of relevant and localized content in an appropriate language (Keniston 2002; Saravanan 2010) [8, 12]. The major intervention in agriculture must have the potential of increasing farmers' income of small and marginal. It is an important to raise agricultural productivity and making farming remunerative for farmers. The issues which have to been tackled for new technologies for enhancing the agricultural progress and helping farmers for higher income. They identified lacunas hindering agricultural prosperity in India such as low irrigation water use efficiency, low rate of seed replacement, non-judicious use of fertilizer reluctance to introduce transgenic seed varieties (GM) weaknesses occurring in agricultural research land use and lease issues including lack of conclusive ownership titling failures of the agricultural marketing system through unreformed (Beriya and Saroja, 2019) [4] The current ICT solutions offer limited scope of benefitting small landholders but there is no difference in adoption due to difference in landholding. Despite the opportunities offered building trust and collaboration where face-to-face communication still remained hard to defeat farmers. (Lokeswari, 2016) [9].

Disseminating Agricultural Information

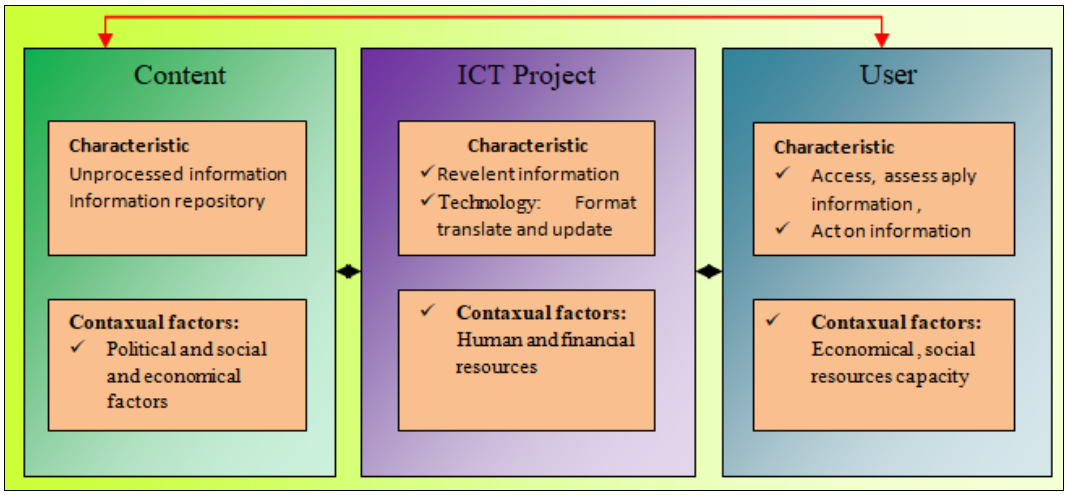
Making Communication among farmers agricultural extension is expected to fulfill all the gap. Government of India proved a way to bridge the yield gap that existed between agricultural research outputs and farmer fields. National Sample Survey Organization (NSSO) According to survey, 60 percent of farmers quiet far to accessed any source of information about modern technology with farmer-to-farmer informal exchanges in relation accessing agricultural information and new technologies in India.

Conceptual framework

The ICT project needs to access the relevant content to its users. This content need to be formatted, translated and should be updated as required through technology for example mobile short messaging service or mobile voice messages. The users must have the capacity and resources to be able to apply and act upon the information provided by the ICT projects. Ultimately, target to develop and manage useful content that users can act upon. As a two-way process, feedback from the side of users of ICT projects what type of content can also affect and useble.

ICT mint to be two-way chain towards activities

Along with reached at 166 million subscriptions followed by China which is five years prior. Annual subscription growth did not drop below 40% until 2011-2015 subscriptions crossed the one billion mark. In 2016, 1.13 billion mobile subscriptions were active in India, slightly less than one subscription per person in the country. Since 2016, new private initiatives have been encountered to make mobile data service affordable or accessible more than earlier (Bajpai, *et al*. 2018) [1].



ICT in moving towards an innovation economy

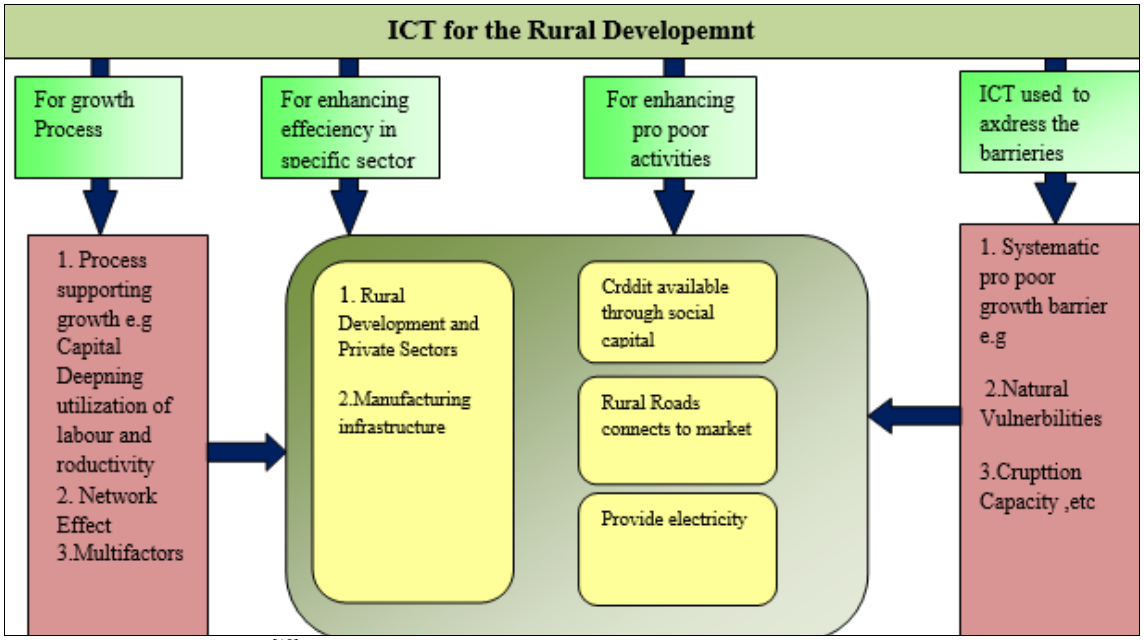
While the telecommunication sector defines the growth and modernization of the Indian economy and raising technologies like a block chain and the it will enhance the choice of consumers, but also enables governments to have better and more efficient governance using technology. (Mukherjee and Chawla, 2018) [10].

Helping farmers in increase Productivity

Indian farmers' adversely impacted by climate change, water scarcity, land degradation, rising input costs and post-harvest losses. Whereas, farmers requeired information about inputs, prices, pest control, risk-management, quality and certification standards. In this context numbers of companies are indulging in favour of farmers on these issues. Such as, German startup, Progressive Environmental and Agricultural Technologies in 2015, along with the International Crop Research Institute for the Semi Arid Tropics (ICRISAT) in Hyderabad has developed a mobile app namedPlantix that contains a large database of pictures of plant diseases using for comparison and diagnosis (Mukherjee and Chawla, 2018) [10].

ICT and poverty reduction

ICT that improves the livelihood of poor rural families will likely to have significant direct and indirect impacts on enhancing agricultural production, marketing and post-harvest activities which inturn can further contribute to poverty reduction (MANAGE, 2020) [18].



***Source*:** MANAGE, (2020) [18]

Developed ICTs initiatives

Sr. No.	Projects	Description
1.	aAQUA	Online discussion, archived, multi-lingual and multimedia based. (www.aaqua.org).
2.	m – Kisan – SMS Based Farm	The m-Kisan, where farmers can get advise on his mobile through SMS. Experts can register and send advisory messages to farmers at www.mkisan.gov.in. The messages are sent in the local language.
3.	IFFCO Kisan Sanchar Limited (IKSL)	Voice messages in local languages. (www.iksl.in).
4.	i -Kisan	Nagarjuna Group initiative, i-kisan.com is a comprehensive Agri Portal addressing the Information, Knowledge and Business requirements of various players in the Agri arena *viz.* farmers, trade channel partners and Agri I/O companies.
5.	e-Sagu	e-Sagu is a web-based personalized agro advisory system uses Information Technology to help farmers adopt scientific management practices of agriculture. e-Sagu, rather than visiting the crop to person, the agricultural expert delivers the expert advice at regular intervals it may be once in one or two weeks to each farm by getting the crop status in the form through digital photographs and other information.
6.	Agmarknet	Government of India with the aim of empowering decision-making ability of the farmers regarding selling of their produce. (Singh, 2017).
7.	asyaSree	One Stop Telugu portal for Information Dissemination asyaSree-a started that identified locally specific, demand driven knowledge solutions in local language through a web portal. The project catered to eight districts in Andhra Pradesh for best crop management practices. (ICFA, 2017).
8.	AGRISNET	Agriculture Resources Information System Network is a mission mode project funded by the Ministry of Agriculture, Government of India to develop a comprehensive online knowledge portal to disseminate relevant information to farmers.
9.	e-Krishi	Web based farm advisory services, market information, resource library and online expert advice (www.e-krishi.org).
10.	Digital Green	Increased seven fold more adoption of farm practices and ten times more effective per dollar spent as compared to the traditional extension system.
11.	Mob. Advisory Services by KVKs of (ICAR)	Mobile advisory services to the farmers by the Krishi Vigyan Kendras (Farm Science Centers) are operational in India, since 2010
12.	e-Arik	E-arik was initiated in the Yagrung village of East Siang district of Arunachal Pradesh, which has covered 12 remote tribal villages.Moreover, the project created an awareness towards ICT potential in agricultural development among the scientists, farm and rural development, administrators whereas, e-Arik team also facilitated awareness programs on natural resource management, child care, nutrition, malaria eradication, rural development, education, etc.

Less Permanency of Knowledge

Most published projects are from research institutions which generally ignored traditional extension system and extension personnel, those who are serving over a long period in rural India. They implemented time bound ICT projects and hired facilitator or intermediaries. In e-Arik case public extension personnel are unwilling to collaborate with the ICT project because of most of the field level extension personnel never used the internet and lack of skill in using other ICTs tools. However, Subject Matter Specialists from Farm Science Centre was willingly collaborated with the e-Arik project (Saravanan, 2008) [12].

One-way Information Flow

Most of the ICT initiatives information flow one-way where limited scope for interaction is considered. In projects such as Farmers Call Centre, Village Resource Centre, e-Arik, e-Sagu, digital green, Lifelines India and IKSL provide opportunities for interaction among farmers and experts (Sulaiman, 2012) [14].

Lack of Systematic Evaluation and co-ordination

In regard to this most of the projects never revealed actual evaluation results reported positive results and most common difficulties such as inadequate rural ICT infrastructure and difficulty in content localization and customization were indicated. Except a few projects large numbers of project evaluation results were never published or communicated. In the absence of collective and coordinated efforts by the public-private agricultural research and extension institutions ICTs have not penetrated satisfactorily in rural India despite time, money and efforts invested so far (Patil *et al*., 2009) [1].

Need for sustainability in ICT interventions

Systematic and comprehensive impact studies on application of ICTs for agricultural extension are not available. The funding agencies are directly and indirectly involved in the development of human resource in the country through their different kinds of the projects. In this context different ICT intervention take place in a local community context of minimal resources. According to (Unwin 2009) [22] sustainability is primarily problem with externally situated ICT4D programmes, and in part reflect a desire by those who create them to guarantee their continued success after the initial period of investment is over.

Trends in ICT for development

The ICT has transformative capacity which can be a productive tool to empower the individual as well as society. It was reveled that new approaches to development 2.0 contain new IT-enabled models that can change the process and structure of development. Fresh ICT models can be moulded by people themselves to fir their objectives produce digital content services to create income (Heeks, 2008) [6].

ICT use in rural India

The ICT initiatives taken up by various stakeholders in dissemination of technology are complied by different authors and organization. Whereas, (45%) of the world ICT project implemented in India and also Asia highest number of information kiosks implemented across rural India (Manzar, 2004) [17].

Technological intervention

The ability for a technology to exist for a longer period shifts in hardware or software affecting its availability or durability.

Institutional sustainability intervention: It is referred as the ability of the local institution created or involved in the project, are managing project activities effectively and efficiently in serving the services to that target clientele during and post project period.

Social and cultural sustainability: It means to fulfill the farming needs of the farmers. It refers to "the intervention is socially and culturally suitable, which has undertaken local traditions, empowering marginalized groups, sharing and aligning goals with local people and adapting to evolving community needs" (Gomez and Casadiego, 2002) [21].

Gender and ICT

This brief gives a short introduction to gender and ICT, provides examples of interventions and gives a quick guide to how gender can be integrated into ICT programmes for development and a tool for change.

Gender specific ICT issues in development

1. Poverty has a multi-dimensional impact on women
2. Women and girls make up nearly 2/3's of the world illiterates
3. Language is a barrier to internet and mobile use
4. Women's rights defenders face gender specific risks
5. Women and women's activists need digital safety

Economic or financial sustainability

The long term ability of ICT project to generate enough income to meet their operational and maintenance costs in relation to reasonable surplus for renewing broken and obsolete equipment (Proenza, 2001) [19].

Conclusion

ICTs have gone through different stages and many of these will continue to evolve in response to changing technology and business environment in agriculture as well as in response to emerging challenges in agriculture. ICT can strengthen the capacities of not only farmers but also for the field level functionaries and intermediaries. There is no platform to share this data and analysis on a continuous basis these are not available for analysts and policy makers to make informed decisions. Thus, the need to design a platform where all the players in the ICT in agriculture sector are willing to share and use data and experience, so that people can collectively learn while the initiatives are in progress and continually innovate. Even though ICT are promising to make and also accelerating information access by some farmers, but most of the ICT project were as pilots institutionalizing of ICT need to be given more emphasis. ICT for agriculture development projects need to be compared and evaluated objectively for its sustainability. Also, to eradicate the digital divide of existing and upcoming intervention we require integration of multi-stakeholders i.e. government, industry sector, community participation, encouraging private partnership, NGOs, etc., factors associated with the success and failure of sustainability of the ICT intervention.

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