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Review Article

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Role of ICTS and Small-Scale Agriculture in India: A Scoping Study

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ABSTRACT

ICTs are meticulous force of change for rural and agricultural growth. It provides development solutions and have been described as one of the main enablers of poverty reduction. They are well-organized implements for reaching rural and remote communities and improving agricultural productivity (Richardson 1997).ICTs include technologies and media that capture, store and disseminate data and information, and they include tools such as video, teletext, voice information systems, radio, mobile telephony, fax and computer-mediated networks among others (Warren 2002). ICTs can speed up the extension of development services in areas such as healthcare, education and agriculture (Van Audenhove 2003). Further, they help strengthen partnerships and provide a framework for shared learning, and have led to increased use of networked information environment and development of platforms for better sharing and exchange of information and knowledge. This has helped to achieve competitiveness (Benkler 2006). Small-scale farmers need information on improved farming practices, technical information, technologies, credit, agro-processing, markets and marketing opportunities. There are a number of emerging ICTs being applied in small-scale agriculture including:- GIS, decision support systems, precision farming, market information system, distance learning, databases, land use planning, public access facilities, mobile applications, restructuring of extension and personal digital assistants. Geographical Information System (GIS) is an information technology that links activities in the field and the office, and allows for comparisons between different types of agricultural data. Although networked information economy cannot in itself solve poverty, hunger and disease, but it provides new avenues for offering a more attractive cultural production system, tapping economic opportunity and sharing and disseminating scientific outputs and innovative linkages between farmers, scientists and researcher. Technological changes have led to social, economic and cultural transformation. Therefore, in order to benefit the rural people, extensionists are grappling with the question of how to connect ICTs to improve rural livelihoods in order to contribute towards better information exchange and access. This paper aims to discuss roe of ICTs in agricultural extension work for doubling farmers' income, identified various gaps such as inadequate skills in the use and application of ICTs, inadequate human resources with the capacity to generate, repackage and digitise local content that need to be bridged to enhance skills and facilitate the exchange and sharing of information and knowledge.

Key wards: *ICTs tool for rural change, Enhance skills, Doubling farmers' income*

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INTRODUCTION

This paper reviews a few study of ICT transforming agricultural science, research and technology generation and the constraints involved in adopting applications which could possibly achieve significant growth impact in Agricultural segment specifically small scale farmers in Indian.

Background

Agriculture plays key role in the social and economic development of most Asian countries and is the main supporter to economic growth and stability. Agriculture sector not only contributes to the national Gross Domestic Product (GDP) and employment but is also a source of foreign exchange earnings. Most small-scale farmers are play a part o the national Gross Domestic Product (GDP) but they are resource-poor and face many challenges. It has been pointed out that emerging technologies and new materials are key success factors in addressing the challenges of small-scale farmers. There are also new opportunities for Indian farmer through new markets, high value products, access to biotechnology and improved information and communication technologies (ICTs). Information and knowledge are considered prime productive resources and play a key role in ensuring food security and sustainable development.

Some key issues and challenges facing small-scale farmers

Small-scale farmers in India have small farm sizes and a weak knowledge-base. They set up agricultural production systems and use mainly traditional tools. They do not use adequate agricultural inputs which lead to declining agricultural productivity. Small-scale farmers have a poor market infrastructure and inadequate marketing experience. The prices offered for farmers' produce are poor and there is poor access to credit. There are challenges of food insecurity, poor storage facilities, inadequate value addition, natural resource and environmental degradation, and declining soil fertility. The problem of small holdings is more serious in densely populated and intensively cultivated states like Kerala, West Bengal, Bihar and eastern part of Uttar Pradesh where the average size of land holdings is less than one hectare and in certain parts it is less than even 0.5 hectare. Rajasthan with vast sandy stretches and Nagaland with the prevailing 'Jhoom' (shifting agriculture) have larger average sized holdings of 4 and 7.15 hectares respectively. States having high percentage of net sown area like Punjab, Haryana, Maharashtra, Gujarat, Karnataka and Madhya Pradesh have holding size above the national average. Current challenges include inadequate security in land, poor water resources management, low irrigation infrastructure, poor extension services, and poor access to agricultural knowledge, information and technologies, inappropriate technologies for the circumstances of farmers, poor rural infrastructure (roads, electricity, and telecommunications). Small-scale farmers are often threatened by globalization and unfair trade practices. Further, they are exploited by middlemen and lack subsidies. The most pronounced challenges facing small scale farmers included the farm sizes, which have been declining over time. Because of this factor, rural people have insufficient land to eke a living[5].

Emerging agricultural issues

Several agricultural issues are emerging as important including the application or biotechnology, commercialization of subsistence farming and formation of focal points of interaction. Biotechnology has opportunity for increasing agricultural productivity and the potential to yield high value agriculture that has the capacity for enhancing incomes of small-scale farmers and reducing poverty. Transformation of subsistence agriculture and the adoption of commercial agricultural practices in response to market requirements have been widely viewed as potential sources of income that can be used to address poverty. Some progress has been made for mechanising agriculture in India after Independence. Need for mechanisation was specially felt with the advent of Green Revolution in 1960s. Strategies and programmes have been directed

towards replacement of traditional and inefficient implements by improved ones, enabling the farmer to own tractors, power tillers, harvesters and other machines. A large industrial base for manufacturing of the agricultural machines has also been developed. Power availability for carrying out various agricultural operations has been increased to reach a level of 14 kW per hectare in 2003-04 from only 0.3 kW per hectare in 1971-72. Small-scale farmers have certain defining uniqueness: they derive their livelihood from holdings of less than 2-5 hectares (usually less than 2 hectares), in normal circumstances they own between 10 to 20 heads of livestock, although often, they have less than 2 or none at all[3]. The family provides the majority of labour, while the farm provides the principle source of income[6]. These small holders need access to improved technologies, best practices, and to appropriate, timely and comprehensive information and knowledge on production, value addition and markets.

Emerging ICTs and their potential in revitalizing and promoting the growth of small-scale agriculture

The FAO[2] asserts that 'information and knowledge play a key role in ensuring food security and sustainable development'. Thus, ICTs are considered to be cross-cutting drivers of change for rural and agricultural development, by connecting rural and remote communities, and improving healthcare, education and agricultural productivity[7]. ICTs can, for example, speed up the extension of development services; can be instrumental in strengthening partnerships and in providing a framework for shared learning. A networked information economy helps to achieve competitiveness, and although it cannot in itself solve poverty, hunger and disease, it provides new avenues for cultural production, creates new economic opportunity, and facilitates the sharing and dissemination of scientific outputs and innovative linkages between farmers, scientists and other actors[1]. These modern ICTs could play a major role in communicating knowledge and information to rural agricultural communities, delivering education modules, accessing inputs, markets and market prices, credit, conducting business, facilitating networking and strengthening partnerships, scaling up inter-linkages of development interventions and increasing agricultural productivity. Media such as the internet, web-based means, and mobile telephony, video, audio cassettes, CD-ROM, radio, fax and computer-mediated networks among others are being used in a number of initiatives in India to provide development solutions.

Exploiting emerging ICTs and their potential in revitalizing / promoting the growth of small-scale agriculture

Based on cost and practicality, a balanced mix of FM, RFID, WorldSpace satellite radio and internet connectivity could be considered by organizations and initiatives supporting or working with small-scale farmers to enhance rural development by facilitating access to markets and up-to-date and timely agricultural and information and knowledge. At present, the ratio of the farmers to the extension worker is 1000:1, which is really very less. 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. There are several models of ICTs in Indian agriculture, which have made a significant difference in the delivery of services in Indian agriculture like, the establishments of Kisan Call Centers, Gyandoot project, Bhoomi project, Village Knowledge Centers, and AGMARKNET. India is positioned as the highest English speaking population in Asia with the highest number of Information Kiosks implemented across rural sectors. 45 per cent of the worlds' ICT projects are implemented in India. India also has a proposal for Rural Info Kiosk project where in one Rural Info Kiosk in each of the 600,000 villages will be established.

Some key questions that need to be addressed through this paper agenda in support of small-scale farmers

Based on the review of this paper a number of research questions are suggested to determine how ICTs can be best used to address the challenges that small-scale farmers face.

Needs assessment

1. What are the best practices for ICTs and small-scale agriculture?
2. What are the agricultural knowledge and information needs of small-scale farmers?
3. What are the benchmarks on ICTs and small-scale agriculture in Africa?

Markets and market research

1. What is the pathway for information flow through the value chain?
2. How can farmers be linked to markets (standards, requirements and certification)?

Information / knowledge management exchange, sharing and dissemination

1. Which is the most effective way of reaching farmers with timely agricultural information and knowledge? (Is it telephone, radio, FM radio stations, print, SMS, or internet, among others)?
2. How can the potential of FM radio stations and digital telephony be harnessed to communicate agricultural information to farmers?
3. How should agricultural information and knowledge be synthesized or repackaged for small scale farmers?
4. Is there a role for an e-repository (of local agricultural content) in Africa in disseminating local agricultural content?

Institutional building and infrastructure development

1. What is the role of public-private partnerships in promoting ICTs to small-scale farmers?
2. How is regional agricultural information and knowledge for small-scale farmers assimilated in the respective regions?
3. How could the participation of women and the youth in initiatives on ICTs and small-scale agriculture be improved?

Training, capacity building and strengthening

1. What is the minimum literacy level required by small-scale farmers to use available ICTs?
2. What ICTs could be used to share and exchange agricultural information, knowledge and innovation among illiterate small scale farmers?
3. What is the role of distance learning in improving uptake of new / improved agricultural technologies?

Contribution of the National Policy on Information Technology, 2012 (NPIT 2012)

Information Technology is a key driver of an increasingly knowledge based global economy. India is well positioned to enhance and leverage its IT capabilities towards this end. Technology has transformational power. It is a great opportunity within and across economies. Recognizing this potential of IT, several economies in the Asia-Pacific region have invested in infrastructure and adopted proactive policies to foster adoption of IT pervasively. Consequently their economies have experienced much faster and more equitable growth and their development indices have moved up rapidly. The Indian economy has achieved a growth rate of around 8 % over the last decade, and the contribution of IT Sector to this growth is significant. The National Policy on IT focuses on application of technology-enabled approaches to overcome monumental developmental challenges in education, health, skill development, financial inclusion, employment generation, governance etc. to greatly enhance efficiency across the board in the economy. The policy seeks to achieve the twin goals of bringing the full power of ICT within the reach of the whole of India and harnessing the capability and human resources of the whole of India to enable India to emerge as the Global Hub and Destination for IT and ITES Services by 2020.The focus of the IT policy is therefore on deployment of ICT in all sectors of the economy and on providing IT solutions to the world. The Policy aims at attaining these objectives through coordinated action on the

part of both the Central and State governments.

Recommendations

The problems of small-scale farmers are complex and multi-faceted. These problems need to be addressed in a holistic manner through a joint approach of establishing priorities and a research agenda. The problems of small-scale farmers could also be addressed by providing a 'package' or 'basket' solution that could be rolled out in a variety of 'mixes' (such as e-microfinance, access to agricultural and market information, agricultural inputs, technologies and innovations, training, local knowledge and e-commerce) in different regions.

Concluding Observations

The livelihoods of farmers could be enhanced through adoption of modern technologies such as , online markets and the application of appropriate ICTs in information and knowledge dissemination. The creation of 'one-stop centres' for training and for linking farmers to markets and restructured extension services that target farmer groups to improve agricultural production and assist in the exchange of knowledge and information. There is a great scope to implement ICT in order to communicate and integrate the complete agri-food supply chain, as the e-choupals are doing in Madhya Pradesh to procure soybean. The other beneficiaries of ICT can be food processing companies, and suppliers within the agri-food sector. On the other hand, the need to market the agricultural produce at reasonable prices will also change the farmers' attitude, and they will be more dependent on ICT. ICTs will, thus, definitely help in fortifying small scale agriculture in India

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