

## Chapter 3 Literature Review

Many studies and research works were carried out on the issue of effect of penetration of mobile phones on the Agriculture sector and other social indicators. There are several writings on the various ICT methods used in India as well as abroad for fulfilling the information needs of the farmers.

The Annual report of Department of Agriculture for the year 2016-17 has enumerated various steps initiated by Ministry for integrating ICT in its Extension activities. (Department of Agriculture, Cooperation and Farmer Welfare, 2017a) As per the report DAC&FW has developed 80 portals, applications and websites covering both the headquarters and its field offices. The report also explains the performance of Kisan call Centre, mKisan portal as well as about 6 mobile apps which were rolled out by the department. These mobile applications are

1. Hailstorm application: Farmers can upload hailstorm photographs with GPS tagging.
2. Crop Insurance : For getting information about insurance premium, notified area etc
3. Agri-Market: Farmers can know the price of various crops in the mandis.
4. Kisan Suvidha : Provide information about weather, input dealers plant protection and expert advisories.
5. Pusa Krishi- Help the farmers to get the information about developed by IARI
6. CCE App- for crop cutting experiments

These apps will function in smart phones with broadband connectivity only. As per the Annual report (Department of Agriculture, Cooperation and Farmer Welfare, 2017a) one of the important app Kisan Suvidha was downloaded by 3.7 lakh phones.

Another interesting study on the three ICT projects in India which was conducted a decade back suggests Marketing information, Question and Answer Service , information about program subsidies and weather forecasting as the information considered most appropriate by the farmers. (Meera, et al., 2006) The projects evaluated were Gyanadoot, iKisan and Warana. Among these, Gyanadoot was implemented in government sector, Warana in cooperative and iKisan in private sector.

Another recent research dwells into the preferred mediums by the farmers to design a framework of ICT use in Agriculture Extension. (Gawade & Turker, 2017) .The paper points out that integrated services are not available at one place for better use of technology. The study has shown Television (34%) as the most preferred medium by farmers followed by mobile phones (25%). Regarding existing systems, 34% of farmers opined that their main source of agriculture information is Agri-Experts followed by neighbours(32%). Most sought after services are Pest Management, Fertilizer information, Weather forecasting and Soil improvement. It also highlighted the need for the use of local language as well as handholding the farmers on the new technologies.

Analysing the information models in China, Zhang et al (2015) suggests seven ICT based information dissemination models. (Zhang, et al., 2015) .These are Web portal, Voice based service, Text Based Service, Self support online community, Interactive video Conferencing service, Mobile internet based service and Unified Multi Channel Service Channel. The paper argues that the appropriate model is to be decided based on information infrastructure, operating costs, farmers capabilities, farmers information consumption behavior and local context. The paper describes different ways in developing, deploying and managing agricultural information services. These are government led, Market driven and community support

mechanisms. The mechanism needs to be selected considering unbalanced economic development in the region.

Ganesan (2013) surveyed the users of Mobile multimedia agricultural advisory system of the State of Tamil Nadu for finding out the agricultural information which the farmers consider relevant to their needs according to their socio-economic conditions.. (Ganesan, et al., 2013) Some of the most appropriate information as per this research is plant protection and package of practices. Among the benefits perceived by farmers, easy and convenient access through mobile phone and time and cost savings by using the mobile were ranked in the first two positions. Among the constraints, inadequate expertise of call centre agents and difficulty in getting accurate weather information are pointed out by majority of farmers.

Analysing the constraints faced by mKisan, Jayanthi and Asokhan(2016)points out non availability of market price is the most important factor as per the farmers. (Jayanthi & Asokhan, 2016) Other important constraints are locally relevant information and lack of follow up from the local extension officials.

Gogoi and Tamuly (2015) has argued that farmers are enthusiastic about mKisan services while KCC has not generated that much interest among farmers. (Gogoi & Tamuly, 2015) Around 40 % of farmers have given a 'high' response to mKisan while no farmers gave 'high' grading to KCC. He also pointed out that 73% farmers considered weather based information received as most appropriate.

According to Mutunga(2016), in Kenya, subsistence farmers are not using mobile phones for their farming needs but use it for social purpose. (Mutunga, 2016). He argued that this is because of lack of awareness and due to the attitude of subsistence farmers. He further argues that very strong institutional policies that encourages implementation of project is needed for the success of mobile based information services

In a study conducted by Cauvery Delta Zone, Ganesan et all (2015) has pointed out that mobile voice messages are an effective communication channel for disseminating agriculture information. (Ganesan, et al., 2015) Majority of farmers who received

these messages adopted the same in their farming activity. Farmers were also of the view that information received through mobiles were better than the information received through other sources.

Maharashtra is one state in which the state agriculture department has done major path breaking ICT interventions for farmers. (Jayade & Khot, 2014) in their article points out that ICT provided new approaches and ways of communicating, transferring and enhancing the knowledge and information among different communities. It lauds the portal [www.mahaagri.gov.in](http://www.mahaagri.gov.in) which acts as a central point for all ICT activities in Maharashtra agriculture department. It points out that mobile based agriculture services are obtaining enthusiastic response from the farming community of Maharashtra. It further emphasized that the significant role played by mobile phones in the daily life of the farmer in providing the needed agriculture information related to modern farming techniques and market prices. During their research, farmers indicated that the mobile phones has played important role in improving the agriculture information. The quality of their life has also been improved subsequently.

Uwe Deichmann et al (2016) in their working paper for World bank (Deichmann, et al., 2016) points out that despite many individual success stories of ICT interventions in many sectors of economy, there has been limited evidence of aggregate improvements in important development outcomes. It clarifies that digital dividends, faster growth, more jobs and better services will fall short if digital investments are not accompanied by reforms in countries' business regulations, skill development systems and public sector governance. It again points out that new technologies like internet and mobile which facilitates information exchange and other forms of communication will reduce the transaction costs in any economy. The use of digital technology tools and functions in the various type of agriculture projects worldwide is given at figure 3.1

As we can gather from the above pie chart SMS is the tool used in about 50% of the interventions and Voice communications for around 30%. The paper further categorises the impacts of such technology interventions as follows:

1. Improve Market Transparency

- a. Greater arbitrage opportunities, reduction in spatial price dispersion, lower wastage, increase in both consumer and producer welfare
- b. Increases in farm-gate prices from improvements in bargaining power with middlemen, greater market participation in remote areas through more efficient coordination
- c. Context specific factors and various marketing and institutional constraints can blunt benefits

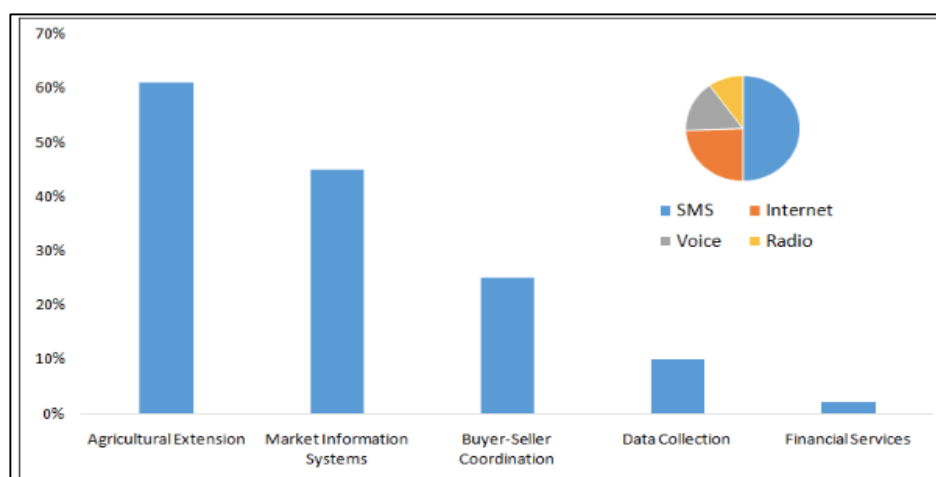


Figure 3-1 : Use Digital technology tools in Agriculture -world wide (Deichmann, et al., 2016)

## 2. Enhance Farm Productivity

- a. Facilitates adoption of improved inputs by providing extension advice and weather forecasts at a lower cost and encouraging agricultural investment decisions
- b. Improvements in rural households' food security, income, value of assets through enhanced management practices
- c. Success of digital technology interventions depend on broader institutional support such as political empowerment, human capital, and income inequality.

## 3. Enable Efficient Logistics

- a. Optimize supply chain management, enhance coordination of

- transportation, delivery of products, and improving capacity utilization
- b. Ensures food safety in global agriculture product chains, tracing from point of origin to consumers
  - c. Facilitates secure payments, allows fast and safe transfer of funds to pay for products and inputs, agricultural subsidies, or remittances

The paper summarises that the impacts are encouraging in its results in rural areas but raises concerns in the failure to scale up and achieving wider acceptance.

In an analysis of mobile phone based agricultural information dissemination system provided by IFFCO Kisan Sanchar Limited in West Bengal, Ashutosh Das et al (2012) points out that farmers mostly need information on weather forecasts, seed, fertiliser, pesticide, machinery and market prices. In their findings, (Das, et al., 2012) they have indicated that for the source of information, many farmers still depend on the progressive farmers in the village followed by IKSL services. Interestingly as per the survey conducted by them information related to fertilisers are the most frequent information received in their mobile. It probably shows a skewness about the information supply as IFFCO also deals with fertiliser supply in the sector. Another important concept about IKSL project is the voice messages features as many farmers still find it difficult to read the SMS's even if it is in vernacular language. It is also found that dissemination of market information is also limited even though the farmer valued this information very much.

In their paper on ICT enabled Knowledge sharing in support of Agriculture extension Balaji et al (2007) has opined that while there are several projects which utilises ICT for knowledge sharing but they are marred by certain limitations. The paper (Balaji, et al., 2007) summarises such limitations. As per the paper, there is prevalence of top-down approaches with few attempts to reflect the end users' preferences and needs. He further points out that production advisory services and market information access do not go together in all such efforts. The limited participation of agricultural education and research institutions appears is also an important limitation. In addition localization and customizability of content are still not practiced on a significant scale in many projects.

They further argue that based on their study based on ICRISAT project in Andhra Pradesh, a hypothesis is forwarded that adding an element of learning among the *'info-mediaries'* might lead to more effective and satisfactory response than the interfaces of telephone or PC based platforms. The research points out that strong linkages with national and local organisation responsible for extension and research are necessary for rural organisations to sustain their information service. National and local organisation responsible for extension need to develop their capacity for online services management in order to make effective use of ICT based channels that are linearly becoming available with local and community based organisation.

As India's agricultural extension system also caters to the other allied sectors like sericulture, animal husbandry and fisheries it is interesting see the examples from these areas also. In a classic paper on the study of information technology on the market performance and welfare of Kerala fishermen, Jensen R. (2007) has argued that when information is limited or costly, agents are unable to engage in optimal arbitrage. Excess price dispersion across markets can arise, and goods may not be allocated efficiently. In this setting, information technologies may improve market performance and increase welfare. Between 1997 and 2001, mobile phone service was introduced throughout Kerala, a state in India with a large fishing industry. The paper argues that the adoption of mobile phones by fishermen and wholesalers was associated with a dramatic reduction in price dispersion, the complete elimination of waste, and near-perfect adherence to the Law of One Price. It points out that both consumer and producer welfare were increased. It further states that it becomes increasingly common to find farmers, fishermen, and other producers throughout the developing world using mobile phones, text messaging, pagers, and the internet for marketing output. The survey has been conducted in three areas in Kerala namely Kasargod, Kannur and Kozhikode districts. They further argued that this raised income had further positive impact on the health and education of the fishermen community. Since the use of mobile phone do not have any government or NGO backings, the fishermen need to pay for the bills and they were willing to do so as there was an increased profit. Thus, making it a self-sustaining model benefitting everybody. The impact of mobile phone usage in sardine price is enumerated in the paper as follows:

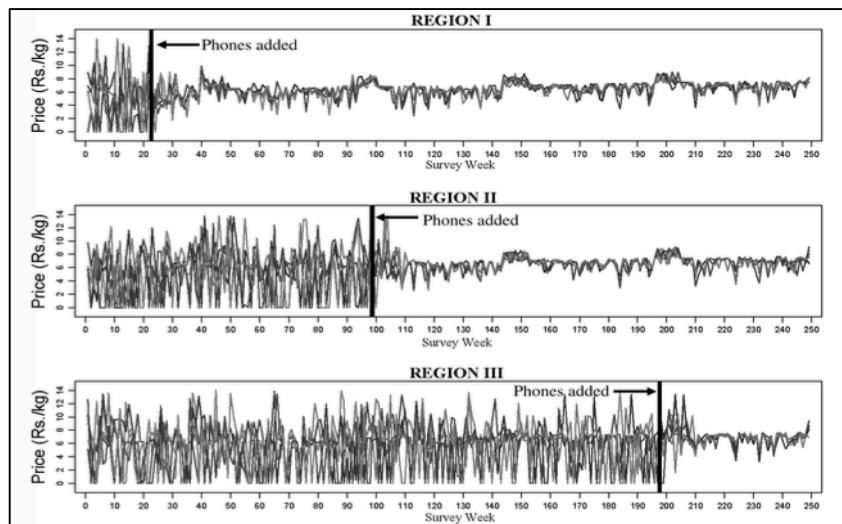


Figure 3-2 Influence of use of mobiles in fish prices (Jensen, 2007)

The survey has been conducted in three areas in Kerala namely Kasargod, Kannur and Kozhikode districts. They further argued that this raised income had further positive impact on the health and education of the fishermen community.

In the of World bank, Goyal, A.(2010) has explained in detail the changes brought by the *e-chaupal* concept of ITC in Madhya Pradesh. India's regulated Agriculture market which came into place to help the farmers and in most of these markets open auctioning are carried out to protect the interest of farmers. In these markets, the small number of traders usually collude to reduce the margins of the farmers. The major advantage of the traders is their knowledge of the price offered by others up the value chain of which the farmers have no clue. During 2000, ITC limited which was one of the largest buyer of soybeans has introduced a unique concept for collecting soybeans by eliminating the intermediate traders. Internet kiosks were set up in villages to enable the farmers to access daily wholesale price of soybeans both in local *mandis* and by ITC. Warehouses were also established that enabled scientific testing of quality that in turn facilitated the sale of soybeans by the farmers directly to the private company. The result of the study had indicated that there is a price increase for soybeans in the regulated market after the introduction of *e-Chaupals*. Traditional traders were losing their hold in deciding the price in the market. The study further points out that the inter *mandi* price variations were also reduced after the introduction of *e-chaupals*.



As seen from the literature review above, there were advantages accrued to the farmers whenever an ICT intervention has been made keeping farmers in mind. Mobile interventions become an important ingredient in the success stories in many developing countries including India. As far as India is considered the major intervention in public extension service in this direction is mKisan and KCC. While some efforts were taken in studying the farmer's opinion about mkisan & KCC projects, no much focus has been given for the study of the pan-India difference in implementation as well as the availability of localised information in these projects.