

# Influence of Mobile in Addressing Information Asymmetry among Indian Farmers: Evidence from North India

Jitendra Mohan<sup>1</sup>, Mohammad Israrul Haque<sup>2</sup> and Umashankar Venkatesh<sup>3</sup>

<sup>1,2</sup>Faculty of Management Studies and Research, AMU, Aligarh, India

<sup>3</sup>Great Lakes Institute of Management, Gurgaon, India

E-mail: <sup>1</sup>jitendrab@gmail.com, <sup>2</sup>haque.mohammad@gmail.com, <sup>3</sup>umashankar.v@greatlakes.edu.in

**Abstract**—Mobile penetration in rural sector is increasing at more pace than urban sector in India. The mobile devices in the hands of Indian Farmers may be used for offering the services that can uplift their lives. One of the important aspects of increasing the farming productivity is making right information available at the right time. In India, the agriculture information is delivered mainly through the agriculture extension network. This paper investigates the use of mobile technology as an alternate medium to disseminate the agriculture information and overcome the challenge faced by the existing agriculture extension network. It also examines how mobile technology helps Indian Farmers in improving their productivity. This empirical study was conducted in a North Indian state, and provides insights into intentions and factors surrounding the use of mobile technology in the context of agriculture information by farmers. It also highlights the social and cultural contexts within which information seeking and use occurs in Indian Farming community.

## 1. INTRODUCTION

Indian Economy continues to be dependent on agriculture in spite of rapid growth of service sector in recent years. With the continued growth in Indian population, it is estimated that the total demand for food grains will touch 280 million tonnes by 2020-21. Meeting this huge demand will require a growth rate of nearly two per cent per annum in food grain production and the agriculture sector needs to grow at a targeted four per cent per annum.

The recommendation of the Planning Commission's working group on agricultural extension for the 11th five-year plan (2007-2011) states that the agricultural growth is stagnating. Hence, there is a clear need for new and innovative approaches to be adopted for agricultural extension in order to achieve the targeted growth rate and serve the farmers better. Further, due to large scale urbanization, land and water resources are depleting fast; hence achieving food security requires "Knowledge Resource". As per NSSO Estimates, it is indicated that 60 per cent of Indian farmers do not have access

to any source of information for advanced agricultural technologies and practices, resulting in a huge adoption gap.

India is going through a mobile revolution since the last decade. Rapid growth of Information Technology including mobile necessitate that we integrate ICT and mobile technology in agricultural extension to provide the much-needed impetus to the sector, as ICTs can complement the traditional extension system for "Knowledge Resource" delivery to millions of farmers [12].

## 2. INFORMATION ASYMMETRY

World Bank has been promoting the traditional extension model, "Training and Visit" extension throughout the developing world. This program is generally consisted of government-employed extension agents visiting farmers individually or in groups to demonstrate agricultural best practices [1].



Fig. 1: Information Needs of Farmers (Adapted from Mittal, 2010)

Like in many developing countries, India too has a system of local agricultural research universities and district-level extension centres, which are producing a wealth of specific knowledge. This knowledge is shared with farmers using the agriculture extension network. According to an RBI report, in 2010, the Government of India spent \$300 million on agricultural research, and a further \$60 million on public-extension programmes.

Still, traditional extension service faces several challenges that limit its effectiveness. The reach of existing extension program is hampered by limited transportation in rural areas and high cost of delivering information in person. In the interior villages in India, farmers often live in houses adjacent to their plots during agriculture season, hence creating a difficulty for both the delivery and receipt of information.

Another challenge for the farmers is that agricultural extension is rarely provided to them on a recurring basis. Also the lack of ability of farmers to follow-up on the information delivered to them may limit their eagerness to adopt new technologies. There are infrequent and irregular meetings which limit their ability to get timely information, such as ways to counter inclement weather or unfamiliar pest infestations.

In a developing country like India most of the times government-service providers face institutional difficulties. The dependency on extension agents to deliver in-person information is subject to general monitoring problems in a principal-agent framework [2]. It is important that when an extension agent reaches the farmers, the information delivered must be locally relevant, and delivered in a manner that is available to them with low levels of literacy.

A recent survey shows that only 5.7 per cent farmers report receiving information about modern agricultural technologies from public-extension agents in India [6]. Agriculture extension workers also face numerous problems like misaligned incentives, and high cost of reaching farmers in interior rural areas. Sometimes the information provided is too technical for semi-literate farming community which may affect the slow adoption and optimal use on new technologies.

Due to lack of expert advice, farmers look for the information through word of mouth, generic broadcast programming, or from agricultural extension worker, who may be poorly informed or get incentives to recommend the inferior-quality products [1].

These difficulties hamper the reliable flow of information from the agricultural research universities to farmers, and may narrow their awareness of and willingness to adapt to latest agricultural technologies. Overcoming these “informational inefficiencies” may, therefore, enhance agricultural productivity and farmer welfare. The emergence of Information Communication technology, mobile phone networks and rapid growth of mobile phone users across South Asia and Sub-Saharan Africa has opened up new vistas for employing newer techniques to deliver agricultural-extension

### 3. M-AGRICULTURE SERVICES IN INDIA

Right information at right time is critical for Indian farmers for their crop. Apart from the Agriculture Extension program initiated by government, There was an effort by Government of India to use mass media like Television and Radio in the early 70s. *Krishi Darshan* program was initiated by the government to take advantage of TV penetration in rural sector to impart information to the India Farmers.

All India Radio (AIR) and *Doordarshan* designed programs to bridge the information gap that provide day-to-day seasonal information needed by the farming community besides giving relevant information pertaining to the latest agricultural technologies.

The mass-broadcasted messages are, however, too general to be of much use and usually serve only as a reminder for regular field operations [8]. On the other hand, individual contact through field-level staff is limited by logistics, cost, resources, skills and the sheer numbers required for effective coverage. With the Information Technology revolution in Indian in Early 90s, there was effort by both public and private sector to provide relevant agriculture information to farmers.

In a comprehensive review of Information and Communication Technologies for Development (ICT4D) projects in India and the use of ICTs in the agriculture sector, Chattopadhyay (undated) estimates that there are over 200 ICT-enabled development interventions in various stages of implementation across the country. These projects provide broadly four categories of services. The first category of ICT projects (e.g.; Bhoomi, Drishtee, etc.) provides information regarding government schemes and programs to rural people and they provide access points for retail products and services in rural India [3,7]. The second group of projects is largely concerned with e-commerce and trading issues (e.g.; e-*Choupal*, Warana, etc.).

The third category of projects (e.g.: *Krishi Vigyan Kendras*/Farm Science Centres at Baramati, Ahmednagar, etc.) provide offline static content on a package of practices, recommendations, locally-relevant technologies, weather information, etc. through strong inter-institutional linkages [5]. Lastly, projects such as Shiksha, SEWA and so on, address capacity-building issues of farmers, rural artisans, women and extension personnel [4]. The ICT tools used in these initiatives include video conferencing, voice-activated call-centre facility, Internet-enabled PC-based networking, voice and text messaging via mobile phones, Internet-based crop-specific digital video, and interactive community radio [9,11]

### 4. MOBILE PENETRATION IN INDIA

According to COAI (Cellular Operators Association of India) report, the Indian mobile subscriber base stood at 970 million in March 2015 and is expected to cross one billion by 2016.

The Indian mobile subscriber base contributes to around 15 per cent of the world mobile subscriptions of 6.5 billion.

Rural mobile subscriber base has been increasing steadily over last 7 years. It was 27 per cent in the 2008 and by 2015 the rural subscriber base has reached 42 per cent of the total subscriber base. It is estimated by the Mobile industry that the most of the mobile growth will now happen from rural segment. A TRAI report states that 93 per cent of the internet users are using mobile devices to access the internet application. It means that mobile devices are fast replacing personal computers to access content available on the Internet. This clearly indicates that a virtual Internet revolution via mobile telephony is afoot in the villages of India.

Hence there is a greater need to use mobile as a tool to provide relevant agriculture information to Indian farmers. This is also evident from the fact that there are various M-agriculture services available in India [10]. Some of the successful M-Agriculture projects are IFFCO Kisan Sanchar Limited, Reuters Media Limited in private sector and mKisan service by Government.

M-agriculture refers to agricultural services, technology dissemination, and communication using mobile devices such as mobile phones, laptops, netbooks, PDAs and other wireless enabled devices.

## 5. RESEARCH OBJECTIVE

In the context of Indian Agriculture and the information asymmetry among Indian farmers, this study pursued answers to the following questions:

1. What is the agricultural information seeking behavior using mobile technology of the Indian farming community in the study area?
2. What are the reasons for seeking agricultural information through mobile technology by Indian farming community?
3. Understand the social and demographic background of the Indian Farming community using M-agriculture services.

## 6. METHODOLOGY

In-depth interviews were conducted with 204 farmers in 24 villages in Aligarh and Bulandshahar districts of Western Uttar Pradesh in the month of May – June. All the respondents had access to mobile technology and were using M-Agriculture services. IFFCO Kisan Sanchar Limited is providing green SIM facility, which provides 5 messages in a day to farmers on the crop as well as market information. Apart from IKSL, some farmers were also using mKisan service offered by Government of India.

Individual farmers were interviewed using a questionnaire that had a mix of closed and open ended questions. Most of the items related to the demographic and socio-economic characteristics of the farmers were closed ended. Information

was collected through face to face interviews by the research team.

## 7. FINDINGS AND DISCUSSION

An analysis of the age of the respondents indicates that only 24 per cent of respondents belong to the middle age category (i.e. between 35 and 45 years of age). Since these districts are well connected through road network, agriculture as an occupation is pursued by the people who have ancestral land, either retired from full time employment or are not able to find full time employment.

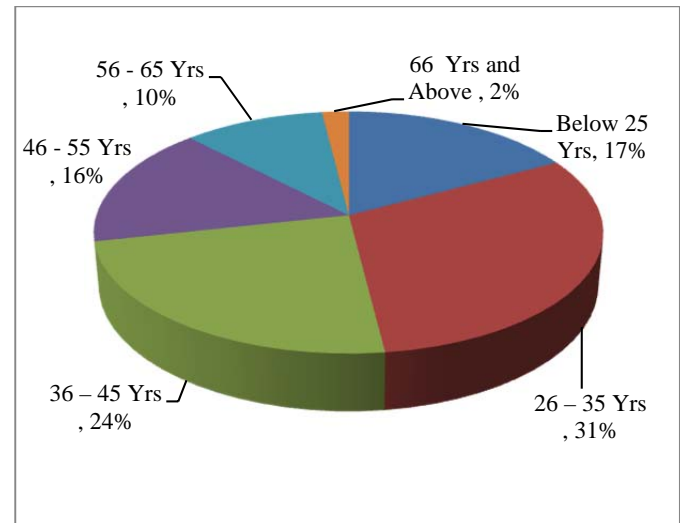


Fig. 2: Age Demographics of the Respondents

M-Agriculture service is popular among the young generation below the age of 45 years. However, the older generation is also using this service since they find it useful in increasing their productivity and know about market prices.

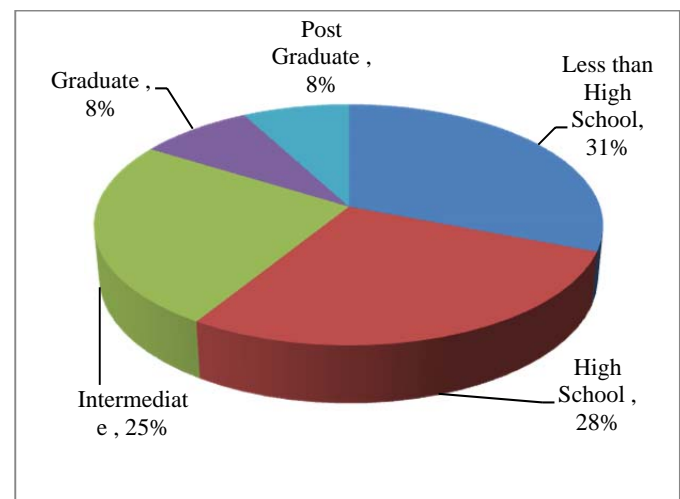


Fig. 3: Educational Qualification of Respondents

All the respondents have primary education, however 28 per cent of respondents have less than High School as qualification. 72 per cent of the respondents have education more than high school, which indicates high literacy in the region. This is due to the fact that western UP has good educational infrastructure. However, the medium of teaching is Hindi but it also indicates that adoption on M-Agriculture services is high if there is adequate, relevant content in local language. M-Agriculture service in this region is offered in the Hindi language which is the native language for the region.

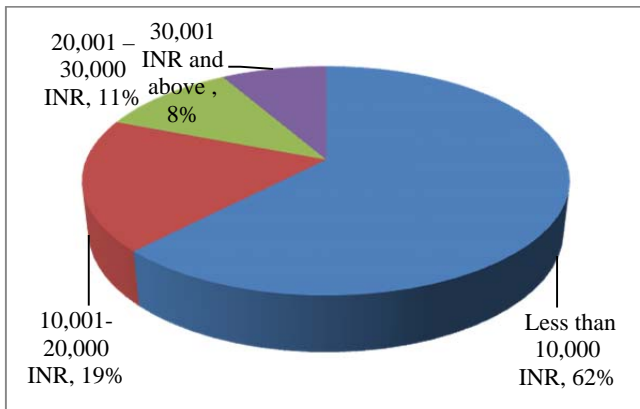


Fig. 4 : Monthly Income of Respondents

Despite the road connectivity to the villages in the area, 62 per cent respondents in the study reas have monthly income less than 10,000 INR . It indicates that even after good road connectivity, government agriculture extension network is not avle to completely fulfill the information needs of the farmers. Farmers in the study area are open to try the new technology to fulfill their information needs. This indicates that while mobile phones are increasingly available to lower income groups and apart from the social use, they are being used to get M-Agriculture information to improve their productivity . They are more willing to experiement and adoption of M-agriculture is high among them .

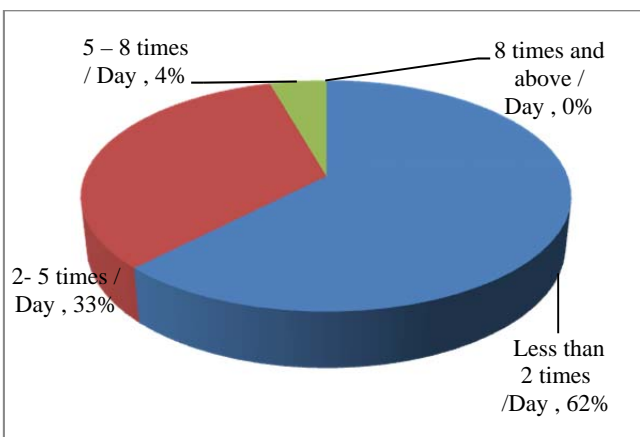


Fig. 5: Use of Mobile to Access M-Agriculture service in a day

All the respondents are using M-Agriculture services at regularly, however the usage pattern is different. 62 per cent of the respondents are using mobile phones to get the M-Agriculture information less than 2 time in day. One of the main reason is that there is no defined time when the voice messages are delivered to farmers and sometimes farmers miss them since farmers do not have a defined work pattern for the day .

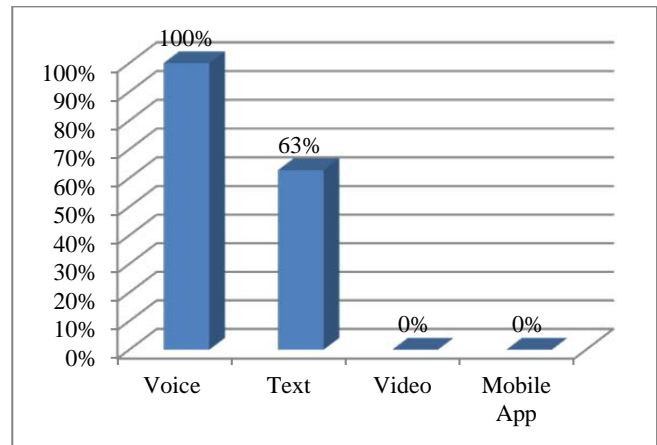


Fig. 6: Use of Mobile application

All the respondents were using voice as the medium to get agriculture information on mobile phones. Even though the text messages ( SMS) are provided in Hindi by the Service Providers, only 63 per cent respondents are using SMS facility. This is also evident from the fact that Service Providers like IKSL are providing voice messages to farmers mail box to address this issue. It was found that smart phones have not made in-roads in rural segment, this is also demonstrated by the fact no usage of video or mobile application related to M-Agriculture was found in the study .

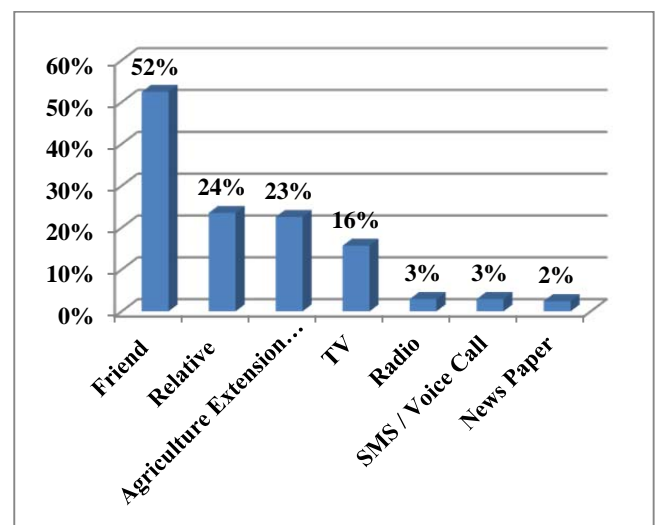


Fig. 7: From where Respondents learn to use M-Agriculture service

Farmers in the study area have learnt M-Agriculture services from a wide range of sources and channels. These include friends, relatives, and agriculture extension, TV, Radio, Newspaper and SMS / Voice Calls. 52 per cent of respondents learned the use of M-Agriculture from their friend. This is followed by relatives (24 per cent) and Agriculture extension workers (23 per cent). 10 per cent of the Respondents learnt the use of M-Agriculture services from their friend as well relatives. People often relied on more than one source/ channel for information.

It was noted that agriculture extension network and M-agriculture service complement each other. The synergy between these two agriculture information networks is quite helpful for the Indian farmers. Mass media is not able to propagate the M-Agriculture services. Although 16 per cent respondents learned about M-Agriculture services from Television, Radio and Newspaper only accounts for merely 4 per cent. The initiative taken by mKisan and IKSL to approach Farmers using SMS and voice calls to make them aware about M-Agriculture service is still in infancy stage.

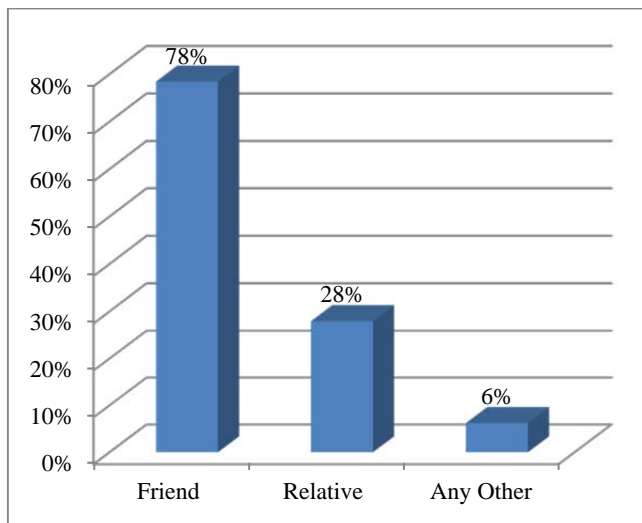


Fig. 8: To Whom Respondents taught the use of M-Agriculture service .

Farmers found it comfortable to share the M-Agriculture service information with their friends. 78 per cent of respondents taught their friends on the usage of M-Agriculture services. Social networks are important to give and share the information. It was found that friends are important for creating informal learning network.

Farmers in the study areas have access to wide range of medium and sources for agriculture information. These information ranges from the interpersonal sources like friends, relatives, elders and neighbours to mass broadcast medium like TV, radio and newspaper to new information technology like mobile.

Access to mobile based agriculture information has made inroads into lower income group. They find it more accessible

and irrespective of their social status in the society, they get the same information as other groups. This group perceived that this parity in the consistent quality information may help them in getting more productivity from their land and more prices from market.

It was obvious that the young generation is more attracted to new technology like mobile and it is evident from the study also, but the M-Agriculture service has also found adoption among the older generation (45 years old and above). This may be due to the incorporation of voice mode to disseminate information and the usage of local Hindi language to overcome the technical barrier.

Adoption evidence on the new medium in mobile technology like Mobile apps and video are not found since most of the farming community has the basic mobile handset. There is electricity supply problem in rural areas. Basic mobile handset has more battery life and cost effective compared to smartphone which supports M-Apps and video messages.

Information sharing in Indian farming community is shared in interrelated informal institutions like elders, relatives and friends. Trust plays an important role in agriculture information acceptance. It was also found in the study that adoption of M-Agriculture services is based on this trust network or friends and relatives.

The study area is well connected through the road network, have better educational infrastructure and access to various agriculture information sources. This study also indicates that information seeking behaviour is not necessarily dependent on the information deficit. It depends on the returns derived from the activity itself (in this case agriculture) and the value that information can add to that enterprise. Agriculture in India is limited by several factors like land reforms, infrastructure, credit, inputs, market, etc. and information is just one of the many inputs that a farmer needs in order to make it a profitable activity. Most of the M-Agriculture initiatives address only the information needs of the farmers. There is a need to broaden the scope to use mobile as tool to address the other aspect of the agriculture so that Indian farmers can convert this information into increased income or enhanced productivity for themselves and the nation .

## 8. CONCLUSION

Information is one of the key inputs in improving the agriculture productivity and helping farmers to get right price for their produce. Information Asymmetry among India farmers due to social, economic and infrastructure reasons severely constraints agricultural productivity in India. This paper discussed the agricultural information seeking behaviour of farmers using mobile devices in the state of Uttar Pradesh, India. It attempted to explain the social and economic demographics behind the use of M-Agriculture service. It was observed that mobile phones were widely available in the study area but were being used for getting the information



about crop disease, weather, harvesting seasons, seeds and the market prices. In the Indian rural context, all the information dissemination mediums coexist. M-agriculture services complement the existing agriculture extension network. It is important to note the growth of mobile network and its adoption in Indian rural sector. Indian Agriculture take advantage of this wireless technology to make the right information available to right people at right time to remove information asymmetry.

Although the evidence is strong on the reach of M-Agriculture in the study areas and the respondents have stories to tell about the impact of M-Agriculture service, the usage of this service is still the weak area. 62% respondents are using this service less than 2 times in a day. Service providers have an urgent need to look in this aspect to make the information more relevant, timely and consistent to Indian Farmers to increase its usage.

This study indicates the possible advantages of M-Agriculture services for Indian Farmers as well as highlight the areas where immediate attention is required by both public and private sector to increase its penetration and adoption.

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