Harnessing Mobile Phone Platform for Transfer of Farm Technologies

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Prelude

There is no dearth of knowledge and new technologies in agriculture, but these rarely reach farmers, especially those in developing countries. Currently, many farmers, especially in developing countries, have very limited access to information, both old and new, that may help improve their farming and livelihoods. The widespread availability and convergence of information and communication technologies (ICTs) - computers, digital networks, telecommunication, television etc in India in recent years have led to unprecedented capacity for dissemination of knowledge and information to the rural population. Over the last five years, several rural sites in India have become testing grounds for the use of Information and Communications Technologies (ICTs) for developmental ends. Project planners hope that rural information networks will allow knowledge, services, money and certain kinds of information products to flow easily across long distances, from one public access information center to another. Production and productivity in agriculture still remains a major concern in developing countries like India. The problems encountered in this activity are pests, diseases, lack of credit and market facilities.

The farmers requirement on information are related to choice of crop, seed variety, options for better crops and varieties, season and date of sowing and harvesting, cultivation practices best suited for the area, input usage, availability of inputs, market demand, transportation, etc. Information and Communication technologies have the best solutions for these problems. Internet and mobile can do wonders to reach the farmers with the necessary information. Of which mobile is fast penetrating device especially in rural areas than the internet.

1. Introduction of mobile or cellular phones

Nowadays, mobile phone is one of the most essential things of people. A mobile telephone or cellular telephone (commonly, “mobile phone” or “cell phone”) is a long-range, portable electronic device used for mobile communication. Most current mobile phones connect to a cellular network of base stations (cell sites), which is in turn interconnected to the public switched telephone network (PSTN) (the exception are satellite phones).

The technology of mobile phone is developing rapidly every day. The following are the stage wise developments that has taken place over the years.

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1.1. First Generation -1G is the name given to the first generation of mobile telephone networks. These systems used analogue circuit-switched technology, with FDMA (Frequency Division Multiple Access), and worked mainly in the 800-900 MHz frequency bands. The networks had a low traffic capacity, unreliable handover, poor voice quality and poor security.

1.2. Second Generation - 2G These mobile telephone networks were the logical next stage in the development of wireless systems after 1G, and they introduced for the first time a mobile phone system that used purely digital technology. The demands placed on the networks, particularly in the densely populated areas within cities, meant that increasingly sophisticated methods had to be employed to handle the large number of calls, and so avoid the risks of interference. Although many of the principles involved in a 1G system also apply to 2G - they both use the same cell structure - there are also differences in the way that the signals are handled, and the 1G network are not capable of providing the more advanced features of the 2G systems, such as caller identity and text messaging.

Fig:1. The various mobile generations

Source: http://www.ieeemacau.org/ieee_student/history%20of%20mobile%20phone.htm

1.3. Second Generation Enhanced - 2.5G is a generic term used to refer to a standard of wireless mobile telephone networks that lies somewhere between 2G and 3G. The development of 2.5G has been viewed as a stepping-stone towards 3G, which was prompted by the demand for better data services and access to the Internet. In the evolution of mobile communications, each generation provides a higher data rate and additional capabilities, and 2.5G is no exception as it is provides faster services than 2G, but not as fast or as advanced as the newer 3G systems.

The enhancements in 2.5G systems permit data speeds of 64-144 kbps, which enables these phones to feature web browsing, the use of navigation and navigational maps, voice mail, fax, and the sending and receiving of large email messages.

1.4. Third Generation - 3G mobile telephone networks are the latest stage in the development of wireless communications technology. Significant features of 3G systems are that they support much higher data transmission rates and offer increased capacity, which makes them suitable for high-speed data applications as well as for the traditional voice calls. In fact, 3G systems are designed to process data, and since voice signals are converted to digital data, these results in speech being dealt with in much the same way as any other form of data. Third Generation systems use packet-switching technology, which is more efficient and faster than the traditional circuit-switched systems, but they do require a somewhat different infrastructure to the 2G systems.

Compared to earlier mobile phones a 3G handset provides many new features, and the possibilities for new services are almost limitless, including many popular applications such as TV streaming, multimedia, videoconferencing, Web browsing, e-mail, paging, fax, and navigational maps. Japan was the first country to introduce a 3G system

1.5. Fourth Generation - 4G As the limitation of the 3G, people are trying to make new generation of mobile communication, this is the 4th generation. This 4G system is more reliable. Nowadays, some companies have started developing the 4G communication system, this technology can have a high uplink rate up to 200Mbps, more data can transfer in the mobile phone. So the 4G mobile can have more function such as work as the television.

2. Features and usability

In addition to the standard voice function of a telephone, current mobile phones can support many additional services such as SMS (Short Message Service) for text messaging, email, packet switching for access to the Internet, and MMS (Multimedia Messaging Service) for sending and receiving photos and video. Mobile phones do not only support voice calls; they can also send and receive data and faxes (if a computer is attached), send short messages, access WAP services (Wireless Application Protocol is an open international standard[for application layer network communications in a wireless communication environment. Its main use is to enable access to the Mobile Web from a mobile phone. A WAP browser provides all of the basic services of a computer based web browser but simplified to operate within the restrictions of a mobile phone, such as its smaller view screen), and provide full Internet access using technologies such as GPRS (General Packet Radio Services). Modern mobile phones usually have a clock, alarm, and calculator and a few games.

Most current models also have a built-in digital camera, that can have resolutions as high as 8M pixels (Samsung). Sound recording and video recording is often also possible. Sending and receiving pictures and videos is possible through MMS, and for short distances with e.g. Bluetooth. (Bluetooth is a wireless communication feature now found in many higher-end phones) Most people do not walk around with a video camera, but do carry a phone. The arrival of video camera phones is transforming the availability of video to consumers, and is helping to fuel the idea of citizen

journalism. These feature when used for development works can add value addition to the efforts of the various departments.

3. Reach of Mobile in India

India is fast booming in mobile technologies. Its subscriber bases are increasing rapidly. India's mobile subscriber base at June 2009 stands at 403.66 million. This brings the total telecom user base to 441.47 million, which includes the wireless and the wireline connections. This growth in the wireless segment is being met with a marginal decrease in the wireline segment which saw a decline of 0.15 million thus pushing the subscriber base to 37.81 million in April against 37.96 million wireline subscribers in March 2009. The tele-density (the number of people having phones per a population of 100) of the nation which increased from 36.98 in March to 37.94 at the end of April. The Rural tele-density which stood at 8% in 2008 has increased to 12 per cent in March 2009.

Rural Wireline Subscriber base stood at 11.33 million in quarter ending June 2008 as compared to 11.64 million in quarter ending March 2008. The major market being held by BSNL Number of Village Public Telephones (VPT) have increased from 5.60 lakhs in quarter ending March 2008 to 5.63 lakhs in quarter ending June 2008.The use of internet is also quite impressive. There are 11.66 million Internet subscribers at the end of June 2008 in India. Besides above, there are 75.97 million wireless data subscribers at the end of June 2008 (capable of accessing data services including internet through mobile handsets.

4. Potential tool to deliver Farm Information

The potentials for its use are many. A number of initiatives are taken by various institutes to harness its potential to their advantage. In rural areas its use is still at infancy. Mobile can be used for short message services like sending flash news on weather information, pest and disease outbreak, market rates, tips on farm practices, messages on new schemes, daily farm activities specific to crops, availability of inputs, etc.

5. Experimentations with mobile across the Globe for Agricultural Technology Delivery

The first way cell phones were used to sustain development is to deliver news about market prices. It is happening for agriculture and fishery, in Africa and Asia. The mechanism is simple: the users are usually farmers or fishermen interested in selling their products. Via SMS they receive information about prices on different markets in their area. In this way they can easily decide where to go to sell their products to maximize the earnings. Following are a few initiatives around the world.

5.1. **IFAD** is running a service of this kind in Tanzania: market spies called "shu shu shu" are scattered around the country to collect information about markets and share them via cellphones with the other members of the same organization.

5.2. The Ugandan **Brosdi** (Busoga Rural Open Source & Development Initiative) is a not for profit organization that works with government and the civil society in improving rural livelihoods. It wants to empower the civil society through knowledge sharing using ICT as a medium so that they can improve their livelihoods. The idea is the following: information and common knowledge is collected during Knowledge Sharing Forums, written, repackaged and sent once a week to the subscribers' cellphone numbers using both a mobile phone and Gmail services. The farmers record the SMS in a book, saving it for future reference. Other farmers without mobile phones at their will can access this knowledge and further freely disseminate it within the village.

5.3. The **CGIAR ICT-KM** has a pilot project focused on recognizing the value of farmer knowledge, to get farmers to value their own knowledge and ideas and find ways to share this knowledge between farmers. The main activity of the project revolved around the organizing of an International Farmers' Conference with over 50 farmers attending. The farmers, instead of being passive participants, were asked to present their situations, knowledge, experiences, ideas and skills using storytelling. Their stories were recorded in video, audio and text forms to be disseminated in various ways and will be made available on the web. Additionally, the organizers uploaded small story clips onto mobile phones and showed the farmers how to send these to other farmers via cell phones. This is to stimulate knowledge sharing and a farmer-to-farmer extension system to facilitate the spread of useful ideas, techniques and knowledge of agricultural activities.

5.4. **Grameen Foundation with Google and MTN Uganda** has launched mobile phone applications that deliver services and information that were previously unavailable to Uganda's poor and disadvantaged communities in June 2009.The five mobile phone applications provide real-time health and agricultural information and a virtual marketplace for buying and selling goods and services. The services are SMS-based and designed to work with basic mobile phones to reach the broadest possible audience. Users can access the services quickly and privately at the time of their choosing and search relevant content on-demand, like someone with access to the Internet. Mobile phone users send an SMS query and receive an automatic answer back from the database. Prices for the services are 110 Uganda shillings per request (about 5 cents), on par with sending a text message to a friend in the country. Prices for requests to the trading marketplace are double, at 220 shillings per request.

5.5. m-learning : The mobile service of agricultural information had been conducted in many provinces in China. Linking with the Internet, radio, television and other media, the agricultural science and technology and market information knowledge can be transmitted to farmer's mobile-phone through the wireless communication network which has covered the whole country, such as China Mobile, China Unicom, China Netcom and etc.

On the software side Frontline SMS, created by kiwanja, is a very useful tool to enables users to send and receive text messages with large groups of people through mobile phones. Frontline SMS is the first text messaging system created to avoid a lack of communication that can affect non-governmental organisations (NGOs) working in developing countries. By leveraging basic tools

already available to most NGOs, as computers and mobile phones, the tool enables instantaneous two-way communication on a large scale.

6. Mobile Experimentation in India

A number of initiatives have been done in India. The following are a few of the prominent ones

6.1. mKrishi : It is a mobile-based crop advisory service of Tata Consultancy Services. The application provides personalized information and expert advice to rural farmers, and runs on Tata Indicom's Code Division Multiple Access 2000 network, and it uses various applications including sensors, camera phones, and Global Positioning System technologies. Through mKrishi, farmers get answers to queries related to agriculture, such as advice on use of fertilizers, pesticides and growth hormones. It also provides up-to-date weather and market information through text messages on cell phones. Services such as assistance with crop insurance, loan services, rural yellow pages and government policy information will be included in a phased manner. The mKrishi application can be customized in farmers' local languages, both text and voice. This feature is particularly helpful for the illiterate in the agricultural community. Currently the application runs as pilot project in four villages supporting about 20,000 farmers each holding an average of three to four hectares of land. The service includes weather and soil sensors for these villages.

6.2. IFFCO Kisan Sanchar Limited (IKSL) : Bharti Airtel and the Indian Farmers Fertilizer Cooperative Limited (IFFCO) have announced the launch of a joint venture (JV) company, the IFFCO Kisan Sanchar Limited (IKSL) to leverage the power of telecom to add value to the farm sector and empower the rural farmer by giving him access to vital information that would enhance his livelihood and overall quality of life. IKSL offers products and services, specifically designed for farmers, through IFFCO societies in villages across the country. The company provides affordable mobile handsets bundled with Airtel mobile connections. Farmers will get access to a unique VAS (Value Added Services)platform that will broadcast five free voice messages on mandi (market) prices, farming techniques, weather forecasts, dairy farming, animal husbandry, rural health initiatives, and fertilizer availability, etc, on a daily basis. There will also be a dedicated helpline, manned by experts from various fields to derive answers to specific queries.

3.3. Reuters Market Light: News and information company, **Reuters** Group in October 2007, rolled out a service to bring commodity prices, crop and weather data to Indian farmers via mobile phone.

Indian mobile providers have been signing up users at more than 8 million a month and total wireless users number more than 200 million. This short messaging service costing 60 rupees ($1.50) a month, is currently available in the western state of Maharastra and has been on trial since April 2007. Information services is in either English or Marathi, the local language. In addition, after an agreement with Maharashtra's Postal Circle, the service is accessible at the nearest post office for farmers without cell phone.

6.4. Mobile for fishermen: The M S Swaminathan Research Foundation (MSSRF) manning the Village Resource Centre (VRC) at a bio-village has launched the icon-based mobile facility, a fishermen-friendly mobile facility which would provide vital information like height of sea waves and weather report. Agricultural scientist Professor, M. S Swaminathan, founder of the MSSRF, with the support of Prof Bruce Alberts, Department of Biochemistry and Biosciences, University of California (USA), launched the mobile phone which would furnish information including weather reports, local news, potential fishing zone and market price to the fishermen. It used software developed by 'Qualcomm´. The information being provided in English by the Hyderbad-based Indian National Centre for Ocean Information Services (INCOIS) to the VRC would be translated into the regional language for the onward communication to the fishermen. The mobile phones with the software facility were supplied to the fishermen.

6.5. Dynamic Market Information (DMI): Tamil Nadu Agricultural University(TNAU), Coimbatore in collaboration with Centre for Development of Advanced Computing (C-DAC), Hyderabad has developed online Dynamic Market Information (DMI) for 13 major markets of South India. It provides data for 152 perishable commodities. Apart from being online farmers are receiving price data over the mobile. The number of markets and commodities is restricted to two. This has been initiated on a pilot basis. The farmers register freely to access the data. This helps the farmers to decide the markets based on their profitability and also avoids distress sale in the local markets without understanding the market trends in the nearby markets.

7. Strategies

7.1. Policy level

Presently the service in the rural areas is concentrated by the public telecom industry. The private industry should also penetrate into the deep villages so that the quality of the service is enhanced. Common towers in rural areas could possibly be a solution which is at the hands of the high end policy makers. The cost of high end technologies, when used for developmental activities should be subsidized so that it reaches the poor and under privileged. The content delivery by SMS is limited hence better technologies like WiFi should be linked with mobile phones to access the World Wide Web.

7.2. Research and experimentation level

Utility of Voice SMS should be tapped as it provides a helping hand to the illiterates. Inclusion of technologies for local language conversion is indispensible in a country like India where language has multi colours. Rural based and agriculture related short messages should be sent by the officials of the development departments, NGOs and those involved in rural development. Provision should be made in the department policies to allocate budget and engage people to develop these messages and send them to the subscribers regularly. These may be provided on subscription basis so that revenue may be generated in a sustained manner. This creates value for the message as well as accountability. Utility of mobile is unlimited as far as farmers are concerned however since many platforms co-exist and the service quality differs, the service markets needs to be normalized.

Conclusion

The mobile industry is one of the fastest developing industries with technologies being upgraded every day. The reach of mobiles has also penetrated to the nook and corner of the country though a bit sluggish in the rural settings. However the developmental activities can be clubbed with this fast technology to reach faster and promptly to the farmers. This will enhance the capacities of the development officials as well as multiply the effects in less time. This is sure to reduce the cost over the years and make developmental efforts easier.