Short Message Service (SMS) Alerts in Agricultural Information Dissemination: a case study

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Introduction

The advent of mobile computing has changed the era of Information Technology by providing value-added services through the mobile phone technology. A simple hand held device has plenty of features to communicate information across the world within no time. The device does not require many supported elements like Personal Computers such as regular power supply and dedicated Internet service to have a communication facility. The mobile Short Message Service known as SMS is a very popular utility of mobile phones to share the information to any one from mobile to mobile.

A few months ago, mobile phones occupied a larger space in urban areas. The prices of mobile phones have slashed so drastically that even the rural community could afford to buy. So far, information services were targeting urban users to offer various services over mobile. The majority of rural community depends on farm and allied livelihood activities. Information like weather conditions, commodity prices, plant protection, agricultural practices etc. are needed by the farmers at right time. Therefore, agriculture can be a good choice for developing information services and disseminating through mobile SMS service.

According to the Telecom Regulatory Authority of India (TRAI), India has over 456.74 million mobile subscribers in both urban and rural areas by August 2009. The mobile growth rate is about 3.42 per cent per month that accounts for 25-30 per cent overall growth every year in both urban and rural areas. SMS will remain the most dominant mobile messaging format for the next decade applications.

Objective

The main objective of this paper is to describe the use of Short Message Service (SMS) to disseminate agricultural information to the farmers' mobiles, based on a real-time implementation in Ahmednagar district by KVK, Babhaleshwar and to develop a standard architecture of mobile SMS application.

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Concept of SMS

Short Message Service (SMS) is a communication service available in mobile devices which uses standardized communication protocols for communication of messages between mobile phone devices. The SMS service got popularized in the world and mobile users are exchanging information through this service. Messages of up to 160 characters including blank spaces can be sent to the other mobiles. The SMS gateway provider facilitates the SMS traffic between service providers to mobile users. Nowadays SMS service is being utilized by business organizations to deliver content, entertainment, and business information to the mobile users. The SMS gateway providers may be just sending messages to the mobile users, or it could be two-way exchange of SMS messages between the SMS gateway and mobile users. The first kind of service delivers the SMS message to mobile user without any request and the second type of service is based on the mobile user's SMS request to the gateway which in turn sends a reply as SMS.

The mobile SMS can be used to deliver digital content such as news, sports information, financial information, and any business communication to the mobile users. Today, the SMS business is over 100 billion dollars in the world. This can be utilized by any sector, particularly the service sector to provide a better service to the users. Value-added services such as songs, ring tones etc are providing content to the users on charge basis. The Value-added service submits the message to the mobile operator's SMS server using a TCP/IP protocol. The SMS server delivers the text using the normal Mobile Terminated delivery procedure. The subscribers are charged extra for receiving the premium content, and the amount is typically divided between the mobile network operator and the Value Added Service Provider either through revenue share or a fixed fee.

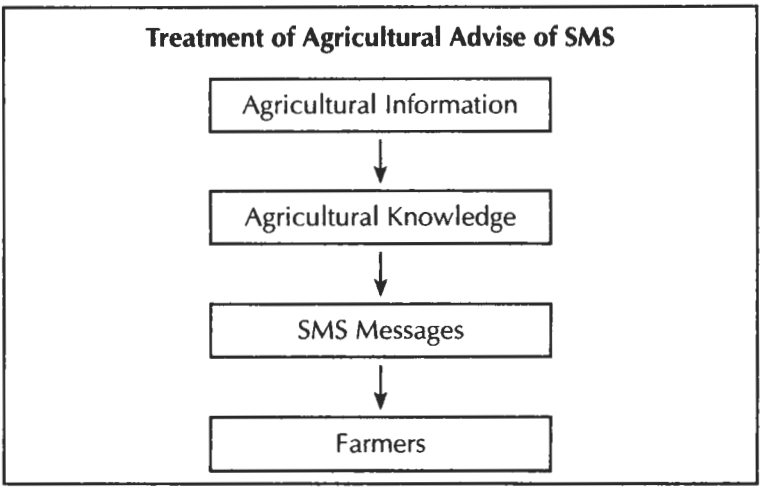
SMS can also be used to deliver the content to more than one mobile user at the same time. This feature is called bulk SMS. Web based bulk SMS Interface enables sending SMS without a mobile phone in a very quick way. This is possible with easy and convenient manipulation with user-friendly interface of Web browsers. Companies and Individuals who want to stay in touch with their staff and customers for their meetings, notices and product announcements are using web based SMS application. This facility helps people to send stock quotes, price alerts, news headlines, sports scores, weather, horoscopes, classifieds exchange rates, product availability, holiday specials packages, and marketing promotional activities. Political parties used this facility extensively during the recent parliament and state elections.

SMS for Agricultural Development

In India, more than 70 percent of the population lives in rural areas and they largely depend on agriculture. Farmers require advise on agricultural practices, plant health and marketing. At present, the farmers depend on various extension channels to get the answers to their queries. However, due to the limitation of present extension channels the farmers are unable to get the proper advise at the right time. Farmers often have to compromise with cropping practices and sell their produce in the market for marginal benefit. The farmers were ignorant of price information of different markets and middlemen exploited them. Though there are information portals on market prices available in the form of AGMARKNET and State Marketing Board portals, the reach of Information Technology and connectivity with Internet in rural areas is still poor. Hence, a suitable mechanism is required to fill the gap between exchange of required agricultural information from scientists and extension personnel to farmers.

The mobile Short Message Service (SMS) is the ideal tool to deliver agricultural advise to the farmers on various aspects of agriculture. The reach of mobile in rural areas is improving and prices of mobile handsets are coming down drastically. An average income holder is able to purchase a mobile phone.

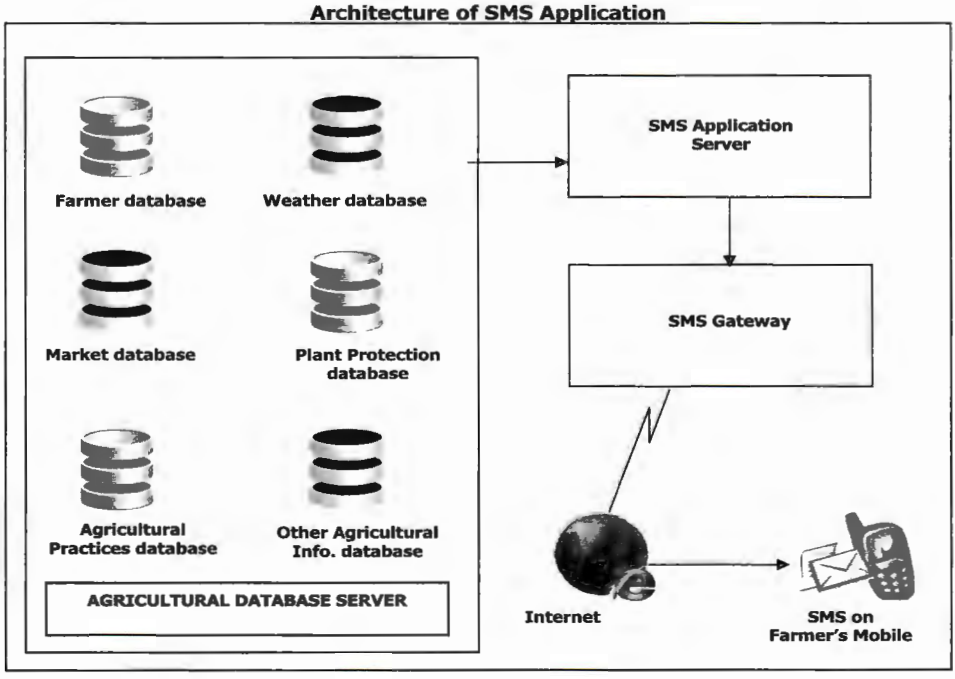
The SMS service is a handy mechanism to deliver agricultural advise to farmers on weather forecasting, market prices, plant protection, agricultural practices, application of fertilizers and pesticides, Government schemes and subsidies. The entire information has to be compiled within the limit of SMS i.e. 160 characters only and it should be understood by the farmer in order to practice in the field. If an advise is not communicated properly to the farmer, it may not give useful results. Hence, it requires special treatment on compilation of agricultural advise. In this process, the agricultural



information should be converted into agricultural knowledge i.e. crisp, understandable and adoptable information, to be sent as SMS message to farmers. The adoptability of such knowledgeable advise is very high. The scientists should have the expertise in converting agricultural information into agricultural knowledge.

Architecture of SMS Application

The design of SMS application consists of three basic modules. They are 1) SMS application server 2) Agricultural Database server and 3) SMS gateway. The SMS application server module acts as an interface between the scientist and farmer to compile the information (SMS) on the screen, select the category of farmers and submit a request for delivery of the SMS to the farmers. This also acts as an interface to collect the details of farmers, and other parameters required to compile the SMS message. The second module is the agricultural database server, which contains database information about farmers, weather forecast, market prices, plant protection measures, agricultural practices crop-wise and Government schemes and subsidies. The third module is the SMS gateway, used to deliver the messages compiled by the first module to the farmers with the help of Internet and network service provider. Finally, the SMS is posted on the farmer's mobile, as illustrated below.



KVK Babhaleshwar initiative

The Krishi Vigyan Kendra (KVK), Babhaleshwar is located in Ahmednagar district of Maharashtra State. The KVK was the first agricultural institution to use mobile service for agricultural information dissemination. The SMS capabilities of mobile phone have been extensively used by the KVK for extension services to the farmers of Ahmednagar district. The service comprises sending SMS alerts on cellular phones of registered individual farmers at the KVK.

The Mobile SMS alert service was inaugurated by Shri Balasaheb Thorat , Minister for Agriculture, Government of Maharashtra on 10 March 2006 on the eve of Annual Self Help Groups (SHGs) and Farmers Clubs Meet organized at KVK Babhaleshwar. About 5000 farmers belonging to 350 SHG and 150 Farmers Clubs members working under the KVK's capacity building programmes attended the meeting. A large number of farmers had shown interest in using the mobile SMS alert service. The first year (2006), the Mobile SMS Alert service was made free and farmers registered for utilizing the service. Farmers then started receiving SMS alert messages on weather, market prices, plant protection, agricultural practices, subsidies and Government schemes from KVK scientists.This initiative benefited many farmers in Ahmednagar.

The service is an important milestone in reaching out to a large number of farmers at a single mouse click. This enables the farmer to have information access at his door-step and take quick action on the advise of the scientist. The farmers are getting the fruits of technology and have overcome the challenges of farming and the market.

The service is a boon for hundreds and thousands of farmers around the KVK within Ahmednagar District. There are currently 284 registered farmers availing this service on paid basis from KVK Babhaleshwar (2009). Registered farmers having cellular mobile handsets supporting major GSM/CDMA networks compatible for Devnagari Unicode fonts within the country can receive the SMS alerts from KVK. In continuing with the KVK's efforts in dissemination of agriculture technological information, the KVK has further started the Marathi based SMS text delivery for the cellular handsets of users within the district. The vernacular delivery module was commissioned with effect from 01 June 2008.

The message incorporates weather alerts, market information and technical advisory and consultancy as a remedy for control of any disease, pest, nutrition or a water management problem. The market price (AGMARKNET portal) and weather information (IMD portal) is sourced from Internet by the KVK Scientist, interpreted and broadcast according to the varying needs of the farming community. The short messages are compiled in English letters indicating phonetic meaning in local dialect. The service is

also used for relaying information in Marathi for the farmers. Daily SMS alerts are being sent on various agricultural developments like weather forecast, disease forecast, market information, plant protection and other issues on demand. The service is also being used as a medium to send information on important training programmes and other programmes to the members of the Farmers Clubs and SHG network under the KVK.

The farmers need to submit their registration details in a SMS Service Registration form. The form comprises of the farmer's name, village, taluka, district, mobile number, mobile model number, land owned, crops grown and its area etc. The farmer can submit the filled-in form to the KVK along with the subscription fee of Rs 100/- per annum. The details of crops available in the form will be used for categorizing the farmers on the basis of crops.

Delivery of SMS Alerts

The messages are compiled on the web-based server from where they are sent to the SMTP relay server of the ISP (Internet Service Provider). Further the SMTP relay server receives digital packets on one side and routes the packets to different mobile service providers. From the mobile service providers the SMS is delivered to the farmer. KVK, Babhaleshwar is using the services of NT Software, Nashik to provide the bulk SMS package to deliver the Mobile SMS alerts to the farmers. The farmers receive the SMS alerts on their mobile without any cost. The entire cost for delivering the alerts is born by the KVK. As on date, each SMS alert cost about 45 paise. If an alert on weather forecasting is being sent to 284 farmers, the cost of the alert is 284*0.45 =Rs. 127.80. The compilation of SMS messages and sending to the farmers require Internet connectivity, which also involves certain cost to the KVK. The cost of SMS alert has been worked out as below:

Cost of SMS Service

Sl.No.	Description	Cost
1.	Basic cost*:	Rs 0.45 per SMS
2.	Internet connection*:	Rs 0.18 per SMS
* Total Cost Rs.*		Rs 0.63 per SMS

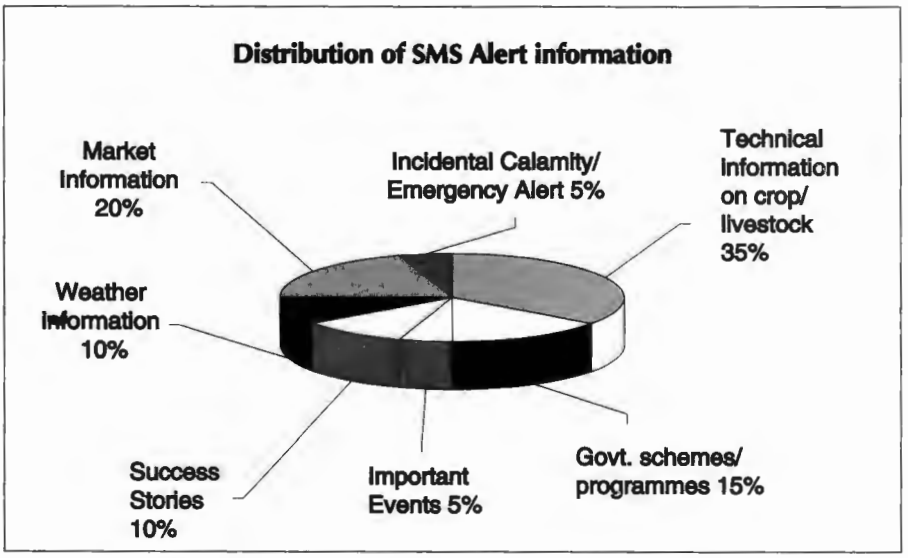
*Cost calculated for a pack of 10000 SMSs from the vendor

The network service provider uses a web-enabled application having domain name www.quicksms.com. The KVK, Babhaleshwar has a user account on the quicksms portal, which provides a secured connection to the SMS application. The SMS alert is compiled on quicksms web portal, then alerts are sent to the farmer groups depending on their need. Most of the time, a common SMS alert on weather forecasting, general preventive

measures are sent to all farmers. Selective farmers group receives need based SMS alerts such as mandi prices, plant protection information, application of fertilizer and pesticides based on their crops and demand. The SMS alerts are stored in a database. This stored database can be used to analyse the SMS alerts crop-wise, advise-wise etc.

Content of messages in SMS Service

Maximum emphasis is accorded on generating crop based information alerts during peak crop seasons and the scientific remedial measures that need to be addressed for the benefit of farmers. The following pie graph shows the particulars of SMS alerts on various content.



* Total number of SMS alerts sent per year during 2008: 360

Impact of SMS Alert System

Major crops such as grapes, onion, pomegranate, soyabean, sugarcane, wheat, banana are cultivated in Ahmednagar district. Apart from these, vegetable crops like bottlegourd, brinjal, capsicum, chick pea and horticultural crops like guava are also cultivated in the district. The SMS information is available at the right time and for all the crops grown by farmers.

The author had discussions with selected farmers among the mobile users in the district, covering about eight percent of mobile subscribers of SMS alerts at KVK. The farmers are satisfied with the SMS alert service provided by KVK, Babhaleshwar. About 70 percent of people have informed that the service is excellent and 30 percent have

said it is very good. The frequency of information send by KVK, Babhaleshwar is daily and some times on alternative days. The farmers are happy with the delivery of messages in time on relevant issues such as weather conditions, mandi prices, plant protection etc. The farmers are receiving about 25-30 mobile alert messages in a month. The cost of SMS is nominal and farmers do not have any problem in bearing the cost of Rs.100 per year. However, some farmers have opined that some SMS alerts may be free for all farmers and some SMS alerts can be charge based to subscribers. They also agree that if every alert is free, the usability of alert service is not effective.

The SMS alert messages are categorized into 1) Weather 2) Market 3) Crop Information 4) Plant Protection 5) Soil Testing and INM 6) and other agriculture related information. The SMS messages on these services are received in time and the farmers expressed that the information is highly relevant and useful to them.

KVK scientists use phonetic English to compile the SMS messages instead of using local native language. For example, an SMS prepared on weather forecasting looks like *"Hawaman: yetya 24 te 48 tasat hawaman dhagal rahun 10 mm mansoon purva aagman hoyil va 10 mm paryant pausachya sari padnyachaandaaz aahe".* The SMS in the form of phonetic English is sent to the farmers because most of the mobile phones do not support local native language fonts. Apart from this, the local language fonts are Unicode type native fonts and occupy double memory space compared to normal fonts. Thus, the SMS message is reduced to half size i.e. maximum of 60 characters. This is a drawback of the SMS alert in local fonts. The system expects the user to understand English and be able to read the Marathi message written in English.

The utility of mobile SMS alert service is quite impressive. The farmers are getting valuable information on weather, mandi prices, pest control at the right time and saving their crops from damage through the advise of SMS alerts. Most of the farmers expressed that they are also getting financial benefit due to the market price information, applying timely recommended inputs etc. Two cases of benefits of mobile SMS alerts service are documented below.

Case 1. Rupees Seven lakh profit earned on Grapes

Shri. Unde Anil Gorakshanath is a farmer of Mamdapur village of Ahmednagar district. He owns about 15 acres of irrigated land and is cultivating crops like grapes, soyabean and pomegranate. The farmer is a member of KVK, SMS alert system since its initiation. The information on weather and mandi prices helped the farmer to take appropriate measures for protecting the crop and also gaining good profits on the produce. During this season, Shri Unde Anil Gorakshanath has earned Rupees seven lakhs extra profit on Grapes by getting SMS advise. The happy farmer

said, "I delayed the selling of grapes in the market by 23 days in the month of April and May based on the weather information available over Mobile SMS alerts, which enabled me to sell 55 tonnes of grapes @ Rs. 30/kg instead of Rs.15/kg during the grape season and earn additional profit of Rupees seven lakhs".

In general, all the farmers sell the grape produce in the market till the end of March every year. During this period, there is heavy competition to sell their produce, which leads to marginal profit to farmers. A small message over mobile enabled the farmer to take a wise decision to sell his produce when the market rate was high by protecting the grape crop based on weather forecast of KVK mobile alerts. This is the impact of mobile alert service for the benefit of farmers and also for agricultural development.

Case 2. Shri. Dadasaheb Tukaram Bendre saved from incurring a loss of one lakh rupees

Shri. Dadasaheb Tukaram Bendre is a farmer of Rahata village, Ahmednagar district. He owns about 19 acres of irrigated land and is cultivating onion, pomegranate, sugarcane, and soyabean. He is a member of mobile SMS alert service of KVK. One day he received a SMS alert from KVK, Babhaleswar on weather conditions that said that there were chances of rain on the day. About 240 tonnes of onion was spread on the ground for drying process and grading. As soon as he received the SMS message on his mobile, he shifted the entire onion produce to the godown. As predicted the area received rain. If, the farmer was ignorant of the SMS alert he would have incurred a loss of one lakh rupees. A simple message on weather helped him to save his produce from a huge loss. The farmer says "Without SMS alerts on mobile, I would have incurred loss on my produce; and, not only this, I am also saving about 10 percent of the cost incurred on inputs used for plant protection."

The farmers are quite happy with the SMS alert service, and, are seeking more and more information on agriculture. The farmers suggestions in improving the SMS alert service are listed below:

1. Weather forecast is required at Taluka-level, for accuracy in the forecast of rain, humidity and temperature etc. It should be accurate and timely, and should be available in the morning and also in the evening everyday. The weather forecast should also suggest the plant protection measures to be taken by the farmers, based on weather parameters.

2. Marketing information is crucial for farmers to sell their produce in the market. The information about the market prices of local *mandi's* should be sent on a daily basis. Most of the time, the SMS on market prices were not the latest. This is because the

prices available (listed) on AGMARKNET / state marketing board portal are not up-to-date. Hence, the market prices of major crops in *mandi's* may be given on a daily basis. The price information on vegetable and horticultural crops can also be made available.

3. The plant protection information can be given at the right time. A picture message of the affected plant will help the farmers understand the problem. The preventive measures to be taken on diseases should be informed at the right time. Information on new pesticides and fungicides available in the market may also be sent by alerts.

4. Agricultural news about new seed varieties, agricultural equipment, Government policies, subsidy schemes, insurance schemes, crop sowing period, export options etc may be sent on a weekly basis. Apart from agricultural knowledge, the information on veterinary and allied sector can also be given.

5. In future, the SMS alerts can be in local native language with MMS (Multimedia Message Service) format.

KVK, Baramati is also using SMS alert service to serve the farmers in their region. The KVK is using SMS alerts to disseminate information on weather and diseases at regular intervals to the registered farmers. The stand alone software for SMS application was developed by IIT, Mumbai. The software uses a SMS Gateway device with a SIM card attached to the local computer to send the SMS alerts. The utility of SMS alert service is highly accepted by the farming community.

Challenges in Implementation

Implementation of the Mobile SMS alert service largely depends on disseminating information at the right time with proper messages. The compilation of messages requires a dedicated scientist to work on compilation of information from various sources and converting it into knowledgeable information to send as an SMS alert. Information on market prices is from external sources like AGMARKNET or state agricultural marketing portals. If they do not list the latest price information, it is of little use to the farmers. This aspect needs to be strengthened and improved in collection of agricultural market prices with the help of other channels.

The mobile SMS text permits only a maximum of 160 characters by most of the mobile handsets. Scientists should understand how the information could be converted into an understandable format in a simple, short text message of 160 characters.

The mobile SMS text can be compiled in the local language of the State. However, this has limitation of availability and support of local language fonts in the mobile

handsets. For example, the Marathi language requires Devnagari fonts support in the mobile handset. Only then it is possible to compile the text in Marathi language for SMS alert delivery. Some of the handsets that do not support Devnagari font are Nokia N70, Nokia 7610, Sony Ericsson W550i, LG RD2130, Chinese N83 models. The availability of Devnagari fonts in the mobile may be verified with the mobile vendor.

The data conversion format for local language fonts uses the Unicode concept of storage. This occupies double the space of normal ASCI character set being used in English characters. The limitation of Unicode local fonts reduces the number of characters of SMS to 60. The message becomes extremely short to convey in a single SMS delivery. Thus, if the message exceeds one SMS alert, it would confuse the farmers in understanding the message and extra cost would be incurred on the SMS delivery.

The farmers may also have certain problems in viewing the messages. Now-a-days, mobile users are getting many business SMS without their need and necessity. This leads to over looking some important messages thinking it was a business message. In order to get farmers' attention to SMS alerts on agriculture, a good practice could be to follow certain timings in the day to deliver the SMS alerts. The SMS alerts can be categorized and delivered at a certain specific time. For example, messages related to weather and market prices can be delivered in the morning, and plant protection and other agricultural information can be delivered in the evening. Specific information at a specific time would attract their attention to SMS alerts.

Future Strategy and Replication of Short Message Service

The mobile SMS alert service is useful and relevant in agriculture. The author observed that the farmers of Ahmednagar district, who are users of mobile SMS alerts are satisfied with the service and getting good results in terms of plant protection, marketing prices, rescued from incurring huge losses by getting timely alert on weather conditions and precautions to be taken. The mobile SMS alert service can be replicated for the benefit of farmers across the country.

Agricultural institutions such as Krishi Vigyan Kendras (KVKs), State Agricultural Universities, Farmers Information and Advisory Center (FIAC) can be selected to implement the mobile SMS service. About 560 KVKs are functioning in the country covering all districts, of which, 50 percent of KVKs are fully equipped with computers and Internet facilities. These KVKs can implement the Mobile SMS service. The KVKs have knowledge of local farming practices. They are also closely associated with farmers of the area in terms of technology transfer and its adoption.

The KVKs could conduct awareness camps on the mobile SMS alert system and encourage the individual farmers, farmer group members, commodity interest group

(CIGs) members to join the Mobile User Group (MUG). Within a year each KVK may have thousand farmers into this group to utilize the mobile SMS alert service. The study shows that the farmers are ready to pay subscription fee for accessing the service at a fixed cost of Rs.100 per year. The SMS alerts like weather forecasting and early protection measures can be given free of cost to all the farmers.

The compilation of information for the SMS alert is need based. The farmers were expecting SMS alerts on a daily basis on weather information, mandi prices, plant protection, crop information, soil testing, Government schemes and subsidies etc. The SMS alert should also be sent at a particular time so that the farmers are well aware of the SMS alert. For example, every morning at 8 clock, the weather SMS alerts followed by market prices SMS alert can be sent while in the afternoon or in the evening plant protection and agricultural news alerts can be sent. The requirement of SMS alerts worked out to be three per day, 90 per month and 1080 per year. If a bulk SMS package of mobile vendors offers for 2 paise per SMS alert, then it would cost Rs. 21600 to reach 1000 farmers. The expenditure can be incurred from the subscription fee collected from the farmers. If each farmer pays Rs.100 per year, the total subscription fee would be Rs.100000 for 1000 farmers. Only 1/4th of the subscription fee is required to purchase the bulk SMS package from mobile vendors. The rest of the subscription fee can be used for Internet connectivity and other administrative charges.

To replicate the mobile SMS alert service on a large scale, a web-enabled SMS application software has to be developed. This is a one time development effort and could be hosted on a central data center server either in MANAGE or NIC. The SMS application software enables each KVK to create individual user accounts, farmers groups, and for compilation of SMS alerts. The agricultural database sever would store all the details related to SMS advice securely. The SMS application system should also provide grouping of farmers according to the crops grown and their information needs, so that SMS alerts could be addressed as per their need. The database server should also have the facility to store compiled SMS alerts in a database on weather, market prices, plant protection and so on. This would generate a huge knowledgebase on agricultural alerts over a period of time.

Conclusion

The mobile SMS alert system is an add-on tool for the extension personnel and scientists to disseminate agricultural knowledge to the farmers every day without meeting them personally. The system is cost effective and extremely useful to the farmers. The mobile service has penetrated deep at the village level and will facilitate the cheapest mode of dissemination of information to the farmers. The database of farmers and Internet based application system enables dissemination of need-based information to the farmers

in the form of SMS alerts. The scientists generate agricultural information and convert it into agricultural knowledge that can be received by the farmers for further practice in the field in order to achieve cost-effective and profitable production. The agricultural system can utilize the services of all KVKs, SAUs and FIACs to implement the mobile SMS alert system in the country to provide better farming knowledge to farmers at the right time.

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References

Paul Gilin. (2008): Social networking and the next generation of handheld devices will improve business decision-making through efficient, unified communication and location awareness, Computer World.

Rober Szikgyi, Miklos Herdon (2007): Mobile Internet in Agriculture application perspectives, Summer University, IT in Agriculture and Rural Development, Debrecen, Hungary.

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