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RESEARCH ARTICLE

EFFECTIVENESS OF MOBILE PHONE BASED AGRICULTURAL INFORMATION ALERTS

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ABSTRACT

M-agriculture (Mobile agriculture) is a phenomenon of mobile enabled agricultural development for leveraging mobile services to enable agricultural development. ATIC (Agriculture Technology Information Centre) of the KAU (Kerala Agricultural University) initiated a project on M-agriculture in 2011 using the e-SMS platform developed and offered by Kerala State IT Mission. ATIC had been sending short agricultural messages of 160 characters, twice a week, to around 12,500 farmers across the state of Kerala. A study was conducted on a sample of 110 farmers selected randomly from the list of 12,500 farmers registered with ATIC. Interview was conducted over mobile phones. In the design and treatment of content for mobile alerts, constraints encountered were (a) limitation of message to 160 English characters (b) message incompleteness (c) seasonal relevance (d) multiplicity of crops in homesteads (e) unintended distortion of messages and (f) inability to use local language. Content of the SMS was primarily sourced from scientists involved in extension activities other than from those involved in basic research. In dissemination through mobile phones, since the personal motivation component is rather weak mere information/knowledge is just not enough for farmers to act. It is the human touch that helps in persuading and motivating farmers to adopt technologies and practices. Messages triggered verbal interaction than message forwards. With regard to message categories, farmers preferred scientific agricultural practices to information about new varieties and expert contact information. The need of the hour is to provide requisite information at the requisitioned time and mobile phones do cater to this particular aspect.

INTRODUCTION

ATIC is a single window delivery system for agricultural information as well as products and technologies developed by KAU. ATIC is thus a window for quality planting materials, seeds, publications, dairy products, meat and meat products, value added products and agricultural information. Since its inception in 2000, ATIC has grown in stature, with the annual volume of transactions capping two crores in 2011. That apart, ATIC has introduced several farmer friendly projects including maintaining a herbal garden, video conferencing with the farmers of Wayanad and M-agriculture. The Information, Communication Technology and Knowledge Management (ICT&KM) program of the CGIAR(Consultative Group on International Agricultural Research) throws light on M-agriculture as a phenomenon of mobile enabled agricultural development or leveraging mobile services to enable agricultural development. Mobile phones have emerged as a strong contender to bridge the digital divide between the urban haves and rural have-nots. Mobile delivery of extension information is an idea whose time has come, as this represents the most cost-effective and widespread interactive delivery medium (Ramamritham et al. 2005). Communication through cell phones is not a replacement of traditional communication tools, but compliments and facilitates the process of dissemination. The challenge is to make such systems usable and accessible to farmers in the appropriate medium and to a level, where they could be used as an indispensable tool along with personal motivation techniques. The reduction in price dispersion with increased cell phone use is also seen in the grain markets in the Sub-Saharan African country, Niger. Cell phones have a greater impact on price dispersion where travel costs are high (Aker, 2008). The expansion of mobile phone networks and increase in mobile-density in Uganda has enabled higher market participation by farmers producing perishable crops located in remote areas and helped them realise higher prices by reducing the information asymmetry that existed between farmers and traders (Muto and Yamano, 2008). The Chinese government invested US$1.13 billion in establishing a mobile infrastructure for about 26,000 villages in recent years through the state owned company, China Mobile, to enable farmers to keep track of weather conditions or forecasts and product prices. In July 2006, China Unicom launched an agricultural wireless information project for farmers in 26 provincial districts. This programme helped farmers access useful information for efficient planning and production (Fong and Michelle, 2009). Mobile phone usage by farmers can reduce the information search costs, thereby dramatically lowering transaction costs and enabling greater farmer participation in commercial agriculture (Silva and Ratnadiwakara, 2008).

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In mid-2007, the IFFCO (Indian Farmers Fertilizer Cooperative Limited) began offering a voice message service to its members, which provided agricultural advice in the form of minute-long voice messages in local languages. The program, which is named IKSL, or IFFCO Kisan Sanchar Limited, is a joint venture between IFFCO and Airtel, the leading mobile provider in India. Farmers receive SIM cards designed by Airtel, called green SIM cards, to receive the messages. The cards can also be used for regular calls. The IFFCO system is currently in 18 states, in India. Farmers receive five messages, each one minute long every day, except on Sundays. Messages come free of cost to the farmers, although they pay to use the helpline service. The Vegetable and Fruit Promotion Council Keralam (VFPCK) and Nokia India Limited have launched a weather and prices information and advisory service for farmers on the SMS format using Nokia's Life Tools services in 2011. The services would initially be on a pilot basis for a period of one year and 300 handsets with BSNL subscriber identification module cards were distributed to farmers' self-help groups under the council. Farmers would get daily information on the wholesale price of 36 varieties of vegetables and six to seven fruits in markets in their neighbouring areas. Cost-effectiveness and language options make the service attractive to the farmers. Weather data from the Indian Meteorological Department (IMD), agriculture news, price inputs from VFPCK and tips and pieces of advice to farmers will be put out in SMS format.

Objectives

1. To study the selected farmers' perception of mobile phone services rendered through ATIC.
2. To analyse the impact of the service on the farmers.

METHODOLOGY

ATIC of the Kerala Agricultural University initiated a project on M-agriculture in 2011 using the e-SMS platform developed and offered by Kerala State IT Mission. Since 2010, ATIC has been sending short agricultural messages, to around 12,500 farmers across the state of Kerala. The messages are snippets of information on scientific agricultural practices, expert contacts, availability of seed and planting materials etc. From the list of 12500 farmers' mobile numbers registered with ATIC, a sample of 110 mobile numbers were randomly selected using simple random sampling. Farmers from eleven districts of Kerala have found representation in the study and their profiles are presented. Perceptions of farmers have been measured in terms of farmer preference on the category of messages, relevancy, timeliness and simplicity of messages. Impact of the service on the farmers has been quantified in terms of action taken on messages (decision making stage and message adoption stage) and farmers networking behaviour with fellow farmers. Constraints encountered are also presented. A structured interview schedule was prepared based on the objectives of the study and interviews were carried out over mobile phones. Simple percentage analysis was done to interpret the results.

RESULTS AND DISCUSSION

Table 1 brings out the fact that the young and the middle aged are more active in using mobile phones for the purpose of agriculture. Nearly two third of the respondents belong to 20-50 age category.

Farmers' Profile

Table 1: Distribution of Farmers According to Age

Age category	Number	Percentage
21-30	6	5.5
31-40	44	40
41-50	30	27.3
51-60	16	14.5
61-70	10	9.1
71-80	4	3.6
Total	110	100

This is not a very surprising trend, as it is the young who embrace new ways of technology. The elderly farmers are not left behind in mobile phone usage as one third of the farmers (51-80 age categories) are found to utilize mobile phones.

Table 2: Distribution of Farmers' Educational Qualification

Qualification	Number	Percentage
Upto SSLC	28	25.5
Pre-Degree	38	34.5
Degree	34	30.9
Master's Degree	10	9.1
Total	110	100

In Table 2 it is seen that nearly three fourth of the respondents have completed their pre-degree, with a good number of them having Bachelor's and Ma ster's degree. The relatively high educational status of the respondents in Kerala is a boon for mobile phone usage, since all the messages are being sent in English. The respondents have therefore no problems whatsoever in comprehension. Having said that, the rest one fourth have given suggestions to provide messages in Malayalam or to transliterate atleast some technical words to Malayalam. We have accordingly modified the messages incorporating simple Malayalam words but written in English.

Table 3: Distribution of Farmers' Land Holding Size

Area	Number	Percentage
Marginal (<= 1.0 ha)	66	60
Small (1.0 – 2.0 ha)	26	23.6
Semi Medium (2.0-4.0 ha)	12	10.9
Medium (4.0-10.0 ha)	4	3.6
Large (> 10 ha)	2	1.8
Total	110	100

Majority of the land holdings in Kerala are homesteads, which fall below the one hectare of land holding category. Thus it is only natural that in Table 3, 60% of the respondents fall under the marginal farmer category, while one fourth of the farmers are small farmers. A small representation (15%) of semi-medium, medium and large farmers finds a place in the sample. Thus the general profile of the farmer under study is that of a marginal, young to middle aged educated farmer of Kerala. More than two third of the respondents read the alerts by opening the message box as shown in Table 4. It is seen that 6% of the respondents did not even open the message box. A closer probe revealed that, some of the farmers did not know to operate the message service.

Table 4: Response to the Receipt of Messages

Response	Number	Percentage
Opening of message on receipt	103	93.6
Not opening the message box	7	6.4
Total	110	100

This is one of the drawbacks of the SMS alert system which presupposes the fact that messaging is a regular and popular practice among mobile phone users. ATIC in its own way has given instructions to farmers on the method of opening the message box, reading and forwarding the messages.

Perception about M-agriculture

Perception of farmers has been measured in terms of farmer preference on the category of messages, relevancy, timeliness and simplicity of messages and represented in Tables 5 and 6.

Table: 5 Farmers' Preference of Message Category

Categories of message	Number	Percentage
Scientists contact	4	3.9
Books & other publications	0	0
New varieties	10	9.7
Agricultural practices	89	86.4
Total	103	100

n=103

With regard to content requirement, farmers' needs were restricted to scientific agricultural practices followed by information about new varieties and expert contact information. Majority of the farmers preferred information on scientific agricultural practices. Information about seed rate, spacing, cultural operations, plant protection measures, bio control and sustainable practices received more attention and appreciation. When contact details of experts were texted to farmers, they contacted scientists for problem solving. This was corroborated when all the scientists involved were probed for the involvement in the M-agriculture communication process. It was found that 90% of the scientists were happy to advise farmers over phone. Nearly two third of the scientists were willing to share their personal mobile numbers while the rest preferred their office numbers The need of the hour is to provide requisite information at the requisitioned time. SMS alerts on a daily basis would be very effective provided they are directed to segmented clients classified according to crop/agro ecological zone/soil. Mobile phones are the most effective technologies that deliver this vital aspect of easiness and targeted contacts.

Table 6: **Relevancy, Timeliness and Simplicity of Message with Respect to Agricultural Operations**

Particulars	Relevancy		Timeliness		Simplicity	
	Number	Percentage	Number	Percentage	Number	Percentage
Most relevant/Most appropriate /Very simple	70	68.0	57	55.3	103	100
Relevant/ Appropriate/ Simple	33	32.0	46	44.7	0	0
Irrelevant / Inappropriate /Complex	0	0	0	0	0	0
Total	103	100	103	100	103	100

n=103

The biggest challenge in the delivery of the message was the brevity of information to be texted. The message must be crisp, bring out a single idea, and be complete in itself. It must be simple to understand and above all support the temporal requirements of the farm. Messages were so designed to coincide with the calendar of operations of important crops in Kerala. Either availability of seeds, planting materials, other technological inputs or alerts on scientific agronomic practices necessary for planting, management and harvesting were provided. Farmers unanimously agree about the relevancy of the content with respect to agricultural operations. All farmers felt that messages were timely and coinciding with the crop activity calendar. Since Kerala has a homestead based cropping system i.e. multiple crops around a home, it is not easy to provide information about all the crops at one point of time. Thus 'timeliness' gets average scores too. Wide approval was also given to the simple language used for the treatment of messages.

Impact of the alerts

Impact of the service on the farmers has been quantified in terms of action taken on messages (decision making stage and message adoption stage) and farmers networking behaviour with fellow farmers which are represented in Tables 7 and 8. Constraints encountered are represented in Table 9.

Table 7: Action Taken on Messages by Farmers

Appropriateness	Action taken on messages for			
	Decision making		Message adoption	
	Number	Percentage	Number	Percentage
Adequate	31	30.1	35	34.0
Some what adequate	72	69.9	40	38.8
Inadequate	0	0	28	27.2
Total	103	100	103	100

n=103

Although messages were found to be appropriate and timely, they have only just about managed to urge farmers towards decision making and action. While messages have helped overall decision making (100% total of adequate and somewhat adequate) they have proved to be less effective in initiating action amongst farmers. Only 72.8% have decided to adopt the communication passed on to them. More than one fourth (27.2%) of the farmers did not act upon the messages they receive as evident in the table. In technology dissemination through mobile phones since the personal motivation component is rather weak, mere information/ knowledge is just not enough for farmers to act. It is the human touch that helps in persuading and motivating farmers to adopt technologies and practices. Messages through mobile phones do not provide this vital aspect of relationship. The complimentary nature of technology with human interaction is again brought to focus here. It is another matter that messages can be stored and reused at appropriate time. It was also ascertained whether farmers would interact with their fellow farmer with respect to the messages they received. Forwarding messages to other farmers is not a practice with only meagre 10% sending forwards. One reason could be that they want to keep the information to themselves and the second would be that they are ignorant of message forwards. The second assumption would hold true since farmer show willingness to interact with fellow farmers over phone as seen in the

behaviour of half of the respondents who are seen interacting with their peers. Thus messages triggered verbal interaction than forwards.

Table 8: Farmer Networking Behaviour with Fellow Farmers

Whether farmer is networking or not	Forwarding of message to peers		Verbal communication with peers	
	Number	Percentage	Number	Percentage
Sharing the message	10	9.7	54	52.4
Not sharing the message	93	90.3	49	47.6
Total	103	100	103	100

Project Constrains

Table 9: Constrains Encountered in the Mobile Services

Constraints	Remarks	Example
Inability to use local language	If the medium of communication was Malayalam, farmers would have found it easier to understand	1.The term Coleus is written as koorkka in English 2. The term banana is used to refer to the plant and the fruit. In Malayalam vazha itself is plant and fruit is pazham
Limitation of message to 160 English characters	Different aspects of planting cannot be explained in clear terms	sowing, spacing, pit size etc.
Message incompleteness	Sometimes two messages need to be sent to give a complete picture of the central idea thereby adding on to the cost	Coconut, Fertilizer application
Unintended distortion of messages	Due to some default systems in mobile technology, some words become distorted at the receivers end	:-Pseudomonas at the sender's end got distorted into a smiley at the receivers end (:-P)
Inability for two way communication	It is neither possible to get a confirmation to the receipt of messages nor can there be any farmers feedback through SMS	Farmers resort to telephonic calls which involve a cost.

Non-Project Constrains

Constraints	Remarks	Example
Seasonal Relevance	Some messages had to coincide with cropping cycle and seasons, whereas messages for sale of publications, products etc were not season bound	Availability of vermicompost in the sales centre (non seasonal) coincided with planting pepper standards (seasonal)
Multiplicity of crops in homesteads	Kerala has a multi-cropping pattern in its homesteads. At any given point of time requirements for vegetables, fruit crops, spices etc. overlap	Specific practices for ginger and turmeric coincided with availability of chilli seeds
No personal human touch	Although mobile phones facilitate individual contact, there is no direct link between the extension system and the farmer thereby leading to a lack of decision making or action	

Summary and Conclusion

SMS alerts presuppose the fact that messaging is a popular and regular practise among farmers. The fact that some of the farmers did not even open the message box of their mobile phones shows how important it is to educate farmers about SMS alerts. Farmers unanimously agree about the relevancy of the content with respect to agricultural operations. All farmers felt that messages were timely and coinciding with the activity calendar. Wide approval was also given to the simple language used for the treatment of messages. While messages have helped overall decision they have proved to be less effective in initiating action in terms of adoption of the alerted practices amongst farmers. In dissemination through mobile phones, since the personal motivation component is rather weak mere information/ knowledge is just not enough for farmers to act. It is the human touch that helps in persuading and motivating farmers to adopt technologies and practices. Messages through mobile phones do not provide this vital aspect of relationship. Messages triggered verbal interaction than message forwards. With regard to message categories, farmers preferred scientific agricultural practices over information about new varieties and expert contact information

Implications and Recommendations

Taking into account the constraints encountered in the project, improved versions of dissemination have to be designed. Voice, Video and newer forms of additional services offered by mobile technology can also be put to test.

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