

Evaluation of a Mobile SMS based Twitter Information Service for Rural Communities: A Case study of Ipologama Vidatha Resource Center, Sri Lanka

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ABSTRACT

Mobile phones have been effectively used to fulfil the information needs of rural communities in different contexts. This study was aimed to assess the effectiveness of a mobile-based twitter information dissemination service implemented by the Vidatha Resource Center, Ipologama, Sri Lanka, applying the Technology Acceptance Model. Fifty-six respondents who have been using the service were selected for the study. Data were collected through an interview schedule. According to the results, the service was useful, easy to use and cost- effective depicting the potential use of such systems to fulfil the information needs of rural communities.

Keywords: Information Services, Information Need, Mobile SMS, Rural Communities, Twitter

INTRODUCTION

Role of Mobile Phones for Access to Information by Rural Communities

It is undoubtedly that technology has been responsible for creating useful information and resources that we need at our fingertips. The demand for technological products has steadily developed in recent years, it has brought higher accessibility and smartphones have become an integral part of people's lifestyle all over the world (Yeo et al., 2020). People use mobile phones for different purposes in addition to its primary use for calling and messaging. During the past few years, mobile phone coverage has been spread fast in Asian, African, and Latin American countries and significantly reduced communication and information costs for rural people (Razaque, & Hassan, 2013). Therefore, mobile phones are increasingly accessible to lower-income groups (Rashid & Elder, 2014), as stated by FAO (2011) "The quickest way to get out of poverty right now is to have one mobile telephone." In the context of the rapid growth of mobile phone penetration in developing countries, mobile telephony is currently considered to be particularly important for development (Rashid & Elder, 2014). Mobile phones have been successfully used to disseminate agriculture information in recent years (Fafchamps, & Minten, 2012; Aker, 2010; Islam, & Alawadhi, 2008). Mobile based information service systems have provided new opportunities for rural farmers to obtain knowledge and information about agricultural issues, problems, and usage for the development of agriculture (Razaque, & Hassan, 2013). Rural communities tend to use mobile phones for different purposes that support their livelihood activities. Furthermore, mobile phones



help to strengthen social ties among the poor and provide them an opportunity to communicate in case of emergencies. This has a considerable development imperative on its own. However, the evidence regarding the role of mobile phones in contributing to greater income generation or employment opportunities remains inconclusive (Rashid & Elder, 2014).

Mobile phones are becoming increasingly popular in the world and Sri Lanka is not an exception, including its rural communities. The computer literacy rate is 30.1% and digital literacy rate is 44.3% of the Sri Lankan population (Department of Census and Statistics, 2019). A study conducted in the North Central Province of Sri Lanka revealed that more than 70% of the farmers possess mobile phones (Dissanayake, & Wanigasundera, 2014). Furthermore, it is the country with the lowest mobile-cellular prices in the world compared to the other countries with much higher GNI - Gross National Income per capita levels (ITU, 2012). Consequently, mobile phones have been contentedly used for information dissemination in different ways at different contexts in Sri Lanka.

The types of information delivered in recent mobile agriculture information systems were mostly related to market information, weather information, and crop advice while most of these attempts were used Short Message Service (SMS) based approaches and interactive Voice Response Systems (IVR). There were attempts to send SMS based on weather alerts and market price information. According to Wijeratne and Silva (2013), an IVR system was being used to deliver information among a group of mushroom farmers. Currently, there's a toll-free agriculture advisory service called "1920" which allows people to make free calls to the Department of Agriculture, to solve their problems related to agriculture and allied fields. Moreover, the Department of Agriculture has been operating a web-based radio named "*Krusha* FM" accessible at www.krushiradio.lk in which people can listen online, call, and interact with different agricultural educational programs for awareness, knowledge, and entertainment.

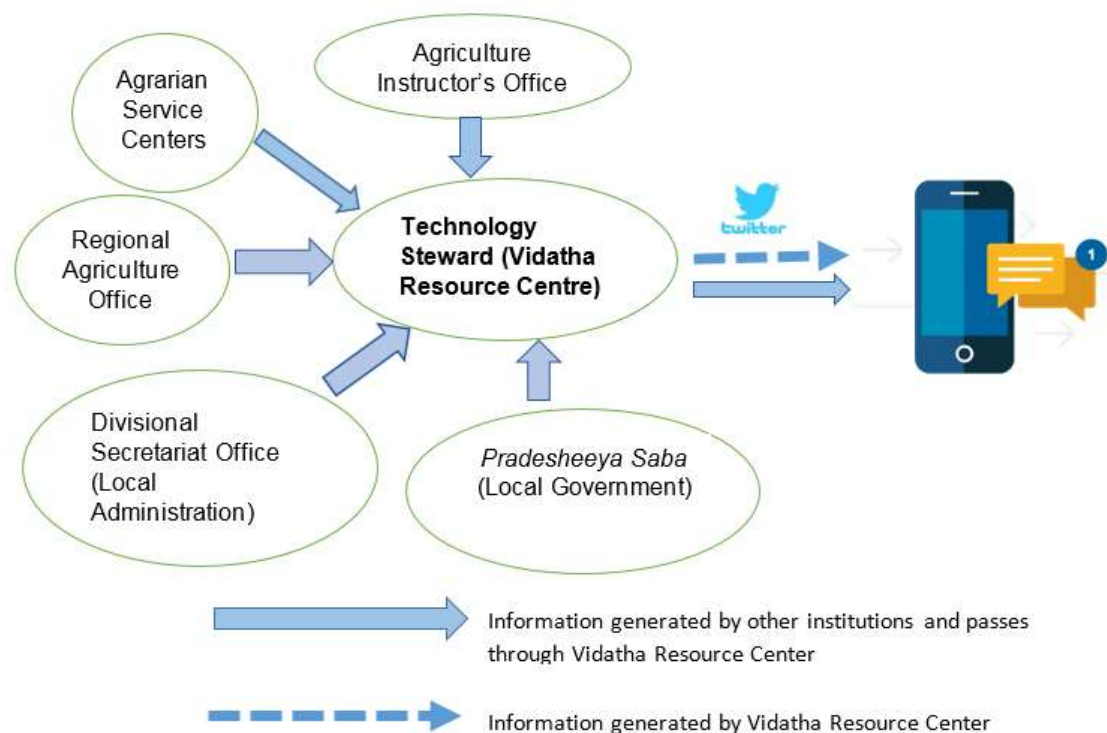
Mobile-Based Twitter Information System Implemented by the Vidatha Resource Centre

Community empowerment helps people in different ways. It helps to develop not only the economic potential of the community but also their dignity, self-confidence and self-esteem (Putera, Sukotjo, Dharmawati, & Mokodompit, 2020). The National Vidatha Network of Sri Lanka seeks to transfer scientific knowledge and technology innovations of scientists to the micro, small and medium entrepreneurs at grassroots levels through an island-wide network of Vidatha Resource Centers. There are 260 Vidatha resource centers established all over the country by the state Ministry of Technology and Innovation under the Science and Technology Development Officers.

Twitter is one of the widely used, freely available, online micro-blogging services. It allows the users to read or send short text messages, usually limited to 140 characters. Users can access twitter through the interface of a website, SMSs, or mobile device apps. Micro-blogging enables real-time interaction between users, using different devices, technologies, and applications (Grosbeck, & Holotescu, 2008). Twitter has previously been used to promote active and informal learning, marketing, and assessment of training (Kassens-Noor, 2012). Twitter-based SMS services are becoming increasingly popular among the contemporary world. This system is being successfully used in different sectors including agriculture for information dissemination.

The present twitter-based SMS service for the rural communities' access to information is a novel system implemented by one of the Science and Technology Development Officers serving at the Ipalogama Vidatha Resource Centre as his own initiative after receiving only LKR 5000 as the seed money from the state ministry for his project proposal. The objectives of this system were to develop and implement a low-cost ICT solution to deliver relevant information to the target community, and provide information for livelihood improvement of rural communities while fostering the right to Information Act (ACT, No. 12 OF 2016) of the government of Sri Lanka. The SMS service was complimentary provided to the receivers, written in the local language with the English alphabet.

Figure 1: Information Flow



Technology Stewardship

A technology steward is a person who identifies information needs of a given community, to select and use appropriate technological platform to fulfil the information needs of the same. The technology steward may be either a part-timer or a fulltimer to solve information and communication needs or to fulfil such needs on daily basis (Gow et al., 2018). Accordingly, in the preset study of the Science and Technology Development Officer of the Vidatha Resource Center was the technology steward. Further, his role was a voluntary service supporting the community to receive relevant information from the related institutions, as mentioned in Figure 1.

Jayathilake et al. (2017) reported two successful technology stewardship interventions with a group of export agriculture farmers in Kurunegala district in Sri Lanka and a rural community served by Janathakshan, a local NGO operated in Batticaloa district. The extension officer of the Department of Export Agriculture and the Technical Officer of the local NGO had played the role of a technology steward for the respective communities

of practices. Low-cost ICT platforms such as Frontline SMS, a text messaging service, and Freedom Fone, an interactive voice response system had been utilized for the implementation.

The role of the Science and Technology Development Officer of the Vidatha Resource Center can be broadly identified as a technology steward. It has created the Twitter-based information system to share information with the community. This study was conducted to i) analyze the messages shared in the twitter-based information system, ii) assess perceived usefulness, ease of use, attitudes towards the twitter-based SMS service, and the actual use of the system by rural people.

The Technology Acceptance Model (TAM) proposed by Davis (1989) is one of the most widely used models to explain user acceptance behavior (Liu, 2005). Davis (1989) introduced the constructs in the original TAM as follows: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), attitude, and behavioral intention to use. Among the constructs, PU and PEOU form an end-user's beliefs on a technology and therefore predict his or her attitude toward the technology, which in turn predicts its acceptance (Liu, 2005).

RESEARCH METHOD

Community members registered with the twitter information system were the sample frame. There were 633 members registered on the system and 56 members were interviewed with a structured questionnaire. Convenient sampling was used to draw the sample. TAM model (Davis, 1989) was used to analyze the effectiveness of the service. Messages shared in the Twitter page at <https://twitter.com/vidathaip1?lang=en>, were extracted from the website for the content analysis. Primary data were analyzed using descriptive and inferential statistical methods.

RESULTS AND DISCUSSION

Demographic Characteristics

Mobile phone adoption, use, and any developmental implications are moderated by many intervening factors such as age, gender, and education (Rashid & Elder, 2014). The age of the respondents ranged from 24 to 80 years and the majority was in between 40 to 60 years. Distribution of respondents according to the level of education showed that majority (52%) had an education up to General Certificate of Education (GCE) ordinary level. FAO (2016) showed that household income is the highest factor that affects the ownership of a mobile phone in the Sri Lankan context. Mean monthly income of a respondent was LKR 31,334 while it ranged from LKR 1800 to 100,000. Although cost is an important consideration for the poor, they seem to spend a substantial amount of their income on mobile phones as well as monthly costs (FAO, 2016). According to FAO (2016), Sri Lankans spend 4-8% of their income on mobile phones. Results of the present study showed that monthly expenditures for different services accessible through the mobile phone ranged from LKR 100 to 5000. The mean value recorded as LKR 548 while the mode was LKR 200. Nearly one third (30 %) of the respondents were full time farmers. Other category (20%) also was engaged in part-time farming. Therefore, the beneficiaries or the target group of the mobile based-twitter SMS service were predominantly farmers. Majority (87%) of the respondents were males.

Mobile Usage among the Respondents

Nearly half of the respondents (51%) had smart phones while the rest had feature phones. Primary use of mobile phones by the respondents was to make (95%) and answer the calls (100%), and to receive (92%) and send SMSs (43%). Use of the mobile phones to access the internet was quite low (26%). That may be due to less use of smart phones, poor internet coverage, and the cost involved to access the internet. The majority (80%) kept the phone with them in every moment. Therefore, it is possible to receive messages quickly by the respondents at any time. However, many of them 75% pay their attention, only to the messages they feel as important. Only a few sought supports from others to read (11%), and send messages (7%). The majority did not respond to the last two constructs as they may were hesitant to reveal that they seek others' support to read and send messages.

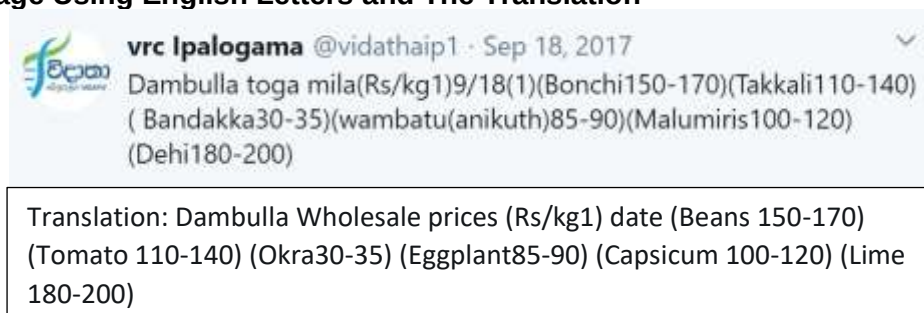
Use of the Twitter Based SMS Service Implemented by the Vidatha Center – Ipologama

Respondents were made aware about the service through various means, such as leaflets, banners, posters etc. They were asked to register for the Twitter-based SMS Service by sending a message to “40404” short code. During the time of study there were 633 members following the Twitter account created by the Science and Technology Officer. About 436 messages have been shared by the technology steward with the registered users during one year of time.

Messages that were posted on the Twitter platform during one year of time were identified under four main areas including vegetable price information, job vacancies, training opportunities and others. Accordingly, there were more messages carrying vegetable price information (36%) and employment opportunities (33%) for rural youth, training programmes (13%). The rest (18%) of the messages were on subsidy programs, loan schemes, agri-business opportunities, exhibitions, crop clinics etc. Daily market prices for vegetables were obtained from the nearby Dedicated Economic Center and were shared with the rural communities those who depend on agriculture as a direct or indirect source of living. About one third of the study participants depend on agriculture as the main income source and 20% as the part time farmers.

A typical message related to vegetable prices is presented in Figure 2 in local language using the English alphabets. Sometimes when the content of the message was too long, and could not maintain within 140-character limitation of Twitter, a several consecutive messages were shared. These messages were written using Sinhala to English transliteration. Such messages were shared almost every day.

Figure 2: A Typical Message Related to Vegetable Prices Is Written in Local Language Using English Letters and The Translation



Perceived Usefulness of the Information Service

The perceived usefulness of the Twitter-based SMS service was measured using five constructs as mentioned below in Table 1.

According to the respondents, the service was useful for obtaining price information (86%), training and other programs (93%), and job opportunities (66%). The majority (91%) of the respondents mentioned that the service saved their time in search of information. The results showed that Twitter-based SMS service is a better approach which provides variety of information that has been directed towards the development of the community. On the other hand, the service is important to facilitate the Right to Information Act (Right to Information Act, No. 12 of 2016).

Table 1: Perceived Usefulness

Statement	Agree (%)	Disagree (%)	Doubtfull / Not Responded (%)
This service was important to obtain information about prices of agricultural produce	86	4	10
It is important to obtain information about training and other programs in the area	93	0	7
The service was useful to obtain information about job opportunities	66	14	20
This service helped me to fulfill my needs	70	12	18
I could save my time spent to find information	91	2	7

Perceived Ease of Use

What matters for the actual use or the adoption of a new technology, is not only the usefulness but also the ease of use. That was measured using four constructs.

Table 2: Perceived Ease of Use

Statement	Agree (%)	Disagree (%)	Doubtfull / Not Responded (%)
Ease of usage of technology	93	2	5
Ease of reading messages	89	7	4
Ease of understanding the content	89	5	6
Ease of getting needed information quickly through this service	95	0	5

As shown in Table 2, the majority perceived that this service is easy to use. However, 7% did not agree and 4% was neutral in response on the easiness to read messages. The messages were written in the local language using the English alphabets. However, as stated by Rashid & Elder (2014), the complicated nature of SMS, very small displays

and less functional user interfaces explain the lag in SMS adoption. Besides, typing on the tiny phone keys, also a great difficulty encountered by mobile users when they do texting (FAO, 2016). Furthermore, the type of mobile phone matters in using the phone for other purposes like taking photographs or accessing the internet. Smartphones serve as handheld small computers enabling people to quickly perform tasks as diverse, research, word processing, translation, voice recording, email, and access to a broad range of information in addition to calling and texting (Allabouche, Diouri, Gaga, & Idrissi, 2016). According to the respondents, 50% of them had smartphones while the other 50% had regular phones with basic features.

The use of peoples' native language or their mother tongue strengthens the development programs, especially within rural communities. This is common even in mobile-based community development. However, FAO (2016) showed that, in Sri Lanka, most of phones were in English making it slightly difficult for users to understand and use them. Some used English alphabets to spell out words in their native language. Those who were not familiar with the English alphabets showed no interest in text messaging. Therefore, the study looked at whether the respondents have facilities to operate their mobile phones in the native language. According to respondents, 79% had local language fonts in their mobile phones while 21% of them did not.

Attitudes towards the Twitter-based SMS Service

It is important to have positive attitudes towards the technology, when encouraging rural people to use ICTs. Therefore, the study focused on attitudes of respondents towards the SMS service as explained by the Technology Acceptance Model. Attitudes were measured using six constructs as shown below in Table 3.

Table 3: Attitudes towards the Twitter-based SMS Service

Statement	Agree (%)	Disagree (%)	Doubtful / Not Responded (%)
I think this type of service mechanism is appropriate as a government/regional information service	89	0	11
Most of messages send through this service are irrelevant to me	5	84	11
This mechanism cannot improve the efficiency of government services	2	86	12
SMS-based information dissemination methods are suitable to communities in this area	95	2	3
I am highly satisfied with the Twitter message service in terms of the cost effectiveness	95	2	3
I recommend all people in our community to register in the Twitter service	93	2	5

Table 3 shows that majority of the respondents had positive attitudes towards the all six constructs used to measure the attitudes. Positive attitudes towards a newly introduced technology is important for its use/adoption by the target groups.

Actual Use

According to the respondents, the information service enabled the majority to participate in events such as training programs (86%), crop clinics (51%), for subsidy program application (41%), and exhibitions attendance (19%) depicting the actual use of information received through the system. In addition, price information given through the service was used by the majority (58%) for buying and selling their agricultural produce. Further, 39 % had used job information received via the service in finding jobs for themselves or their family members. As well as 70% of the respondents had given the job information which have been received from this service to those who were not registered on the service.

Willingness to Future Use and Trustworthiness of the Service

Most respondents (84%) agreed for further use of the service, while 18% may had a chance to discontinue the usage of this service. Trustworthiness is another important factor that affects the usage of this SMS service. The majority (89%) of respondents agreed that the trustworthiness of the information disseminated via the Twitter-based SMS service as they were disseminated by the Vidatha resources center as a government organization. A very low percentage (10%) of respondents were neutral in their response for trustworthiness.

Association between Different Variables

Table 4: Correlation matrix

Variables	Perceived Usefulness	Perceived Ease of Use	Attitudes	Actual Use
Perceived Usefulness	-	0.545**	0.494**	0.314*
Perceived Ease of Use	0.545**	-	0.360**	0.049
Attitudes	0.494**	0.360**	-	0.278*
Actual Use	0.314*	0.049	0.278*	-

***Correlation is significant at the 0.01 level (2-tailed)*

**Correlation is significant at the 0.05 level (2-tailed)*

Results showed that there are moderate positive associations between perceived ease of use and attitudes, between perceived usefulness and attitudes, and between perceived usefulness and perceived ease of use. All the above associations were significant at the 0.01 confidence level. Furthermore, a moderate positive relationship ($p < 0.05$) was found between attitudes and actual use, which results, higher actual use when higher the positive attitudes on Twitter-based SMS service.

Challenges and/or the Limitations

The Vidatha Resource Center gathered information from different government institutions and disseminated to people in the locality. In addition, the Vidatha Resource Center itself generated information and shared among the people. However, there was no formal mechanism to receive information to the technology steward of the Vidatha Resource Center. Further, some officers showed awkwardness in providing information

due to disintegration of bureaucratic government organizations and some other socio-political reasons. Besides, technical problems like system non-responsiveness of the twitter platform which appears as a result of overloading messages limits the acceptance of this service by people. Although LKR 5000 was received as an initial fund, there was no operational finance for the sustainability of the service. Furthermore, administrative support from relevant authorities was inadequate specially to receive the relevant information to share through the service.

CONCLUSIONS

The Twitter-based mobile SMS service implemented by the Vidatha Resource Center at Ipalogama in Sri Lanka is a success story of low-cost ICT initiative. The service helped the community by providing different types of information important for their livelihood. Most users perceived that this service was useful, easy to use and people had positive attitudes towards the service. Further, most of them were willing to keep using the service, and they perceived that information disseminated via this service was trustworthy. Importantly, the perceived ease of use and the perceived usefulness had significant positive associations with attitudes towards the twitter-based SMS service. Furthermore, attitudes significantly correlated with the actual use of the service. Therefore, it is important to develop positive attitudes of the community members on the system. Furthermore, making people familiar with different features of mobile phones, providing information according to the demand, providing administrative and financial support, as well as the motivational incentives to the technology steward will improve the effectiveness of the service while ensuring the sustainability.

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