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Exploring the Use of Modern Sources of Information in Agriculture: Usage and Perception of Sri Lankan Farmers

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ABSTRACT

Sri Lanka has made many interventions to promote ICT in Sri Lankan agriculture over the last couple of decades but those initiatives have not been able to make a significant impact. This study explored the present level of use of modern information sources by the Sri Lankan farmers and their perceptions. Data were collected interviewing 275 vegetable farmers using a structured questionnaire. The findings showed that a high percentage of farmers use mobile phones (87 percent) but smartphone usage is significantly low (8 percent) due to the high cost, low functional abilities, operational difficulties, and poor reception. The usage rates of mobile mediated agri-information systems (13 percent) and the internet (9.5 percent) for accessing agriculture information were reported as very low. It further revealed that the majority of farmers believed that mobile phones (60 percent) and mobile mediated agri-information systems (65 percent) could be useful to access the required information for their farming activities. Further, the farmers disclosed their willingness to adapt (75 percent) and their confidence (77 percent) in the modern information sources. The study suggests facilitating the farmers to use smartphones by deploying necessary financial, technical, and emotional support which would promote the use of modern information sources.

KEYWORDS: Agriculture Information, Modern information sources, Mobile, Mobile mediated agri-information systems, farmers' perception

1. INTRODUCTION

Agriculture is an unprecedented economic activity responsible for providing food and nutrition, generating employment and incomes, and providing several vital ecosystem services. Today, world agriculture obliges to produce an increasing amount of food and non-food products to cater to the growing world population amid several challenges like shirking arable land extent, productivity losses, pest and disease outbreaks, and climatic changes. Thus, it claims that the world-agriculture is the most challenging sector in the 21st century (Gunawardana & Sharma, 2007).

Sri Lanka is an emerging economy in the south Asian region with a total population of 21.2 million and a per capita income of UDS 3,682 by the year 2020 (Central Bank of Sri Lanka, 2020). The agriculture sector of the country plays a significant role by contributing about 8.3 percent to the national GDP and 23.7 percent to the national employment generation.

Information and communication technologies (ICTs) have tremendously revolutionized all the sectors influencing all aspects of human life. Passing through several revolutionary periods, today, the world of agriculture is striving through information and communication technology. Agriculture is a complex socio-economic, ecological and political activity, requires an array of data and information to make informed decisions. In this context, farmers' access to information in developed countries has transformed through the increased digitization of industry and government information and other supportive services over the last couple of decades (Starasts, 2015). Following a similar trend, even though not to that extent, agriculture in the developing world, especially in South Asia, is becoming more knowledge-intensive than resource-intensive (Awuor et al., 2013). Consequently, Information has become an indispensable input in agriculture (Adereti, 2006).

Accordingly, current applications of computers and ICTs in agriculture range from making a simple mobile call to access information to the use of intermediate and advanced

applications like mobile-mediated agricultural information systems, e-agriculture, m-agriculture, cyber extension, precision agriculture through informatics of cultivation, and mechatronics technologies and agriculture resource planning via global positioning systems (GPS) and global information systems (GIS), etc. So, ICT has paved a path to make agriculture more connected and precise. Thus, when it considers the pace and passion of revolutionizing the ICT sector, the opportunities available for agriculture to get benefited from ICT are immense and astonishing.

The telecommunication sector in Sri Lanka has dramatically changed and advanced since 1977 passing through several significant milestones (Gamage and Halpin, 2007). Consequently, Sri Lanka has achieved a significant level of development in both ICT infrastructure and ICT literacy during the last few years (Table. 1.1).

Table 1.1: Telecommunication Use Statistics and Performance of Sri Lanka

Telecommunication use statistics	Percentage
Fixed line phones	10.5
Mobile subscriptions	150.4
Social media usage	28.9
Household computer usage	22.4
Household Internet usage	10.3
Household email usage	10.2
Performance indicators	
Computer literacy	30.1
NRI ranking	83 (out of 121 countries)
ICT Development Index ranking	116 (out of 166 countries)
UN e-Government Development Index ranking	74 (out of 193 countries)

Sources: Department of Census and Statistics of Sri Lanka (2019); WEF (2019)

In parallel to the development of the telecommunication sector of the country, several initiatives have been taken to promote ICT applications in the Sri Lankan agriculture sector (De Silva et al., 2012; De Silva & Rathnadiwakara, 2010; Gamage & Halpin, 2007; Walisadeera et al., 2015; Wijekoon et al., 2006). The use of IMM CD-ROMs as crop-based information materials (2004), cyber extension (2004), a farmers' database for e-marketing, the Toll-Free Agriculture Advisory Service (2004), and the Cyber Agriculture "WikiGoviya" website (2013) are some of the significant interventions made by the Department of Agriculture of Sri Lanka (Wijekoon et al., 2006). Meanwhile, the Ministry of Agriculture, together with Mobitel Sri Lanka (Pvt) Ltd, launched a mobile phone-based agri-produce price information service (Mobitel Agri-price Index 6666) to provide market price information for agricultural commodities (HARTI, 2013). Dialog Axiata, the largest mobile service provider in the country has also introduced the Dialog TradeNet agri-price service enabling access to the market prices of agricultural commodities (Dialog Telekom, 2009).

As mentioned above, many interventions have been made to introduce and promote ICT into Sri Lankan agriculture. However, on the whole, these initiatives have not been able to make a significant impact on the country's agricultural information and knowledge dissemination process due to several reasons including the lack of appropriate digital contents, ICT proficiency, training, level of trust in ICT, technology infrastructure, cost of technology and, accessibility (Walisadeera et al., 2015 and Pavitrani et al., 2011). In this context, it is vitally important to explore the current level of adoption of modern information and communication sources by the farmers and their perceptions. Thus, the research problem recognized in this research was, what is the level of use of modern information sources by the Sri Lankan farmers and what perception they held on the modern information sources.

Creating a comprehensive understanding of the present status of the adoption of modern information sources by the farmers and their perception of their usability are fundamentally important in assessing the efficacy of current interventions and in designing future interventions. Hence, the findings of this research will be important for ICT solution developers, promoters, and policymakers as well as for academics and researchers.

Accordingly, the present study aims to explore the present status of the use of modern information sources by the vegetable farmers of Sri Lanka and their perception of the usability of modern information sources to enable their farming activities. In this study, the vegetable farmers were selected as a representative group considering certain characteristics such as their engagement in commercial agriculture, use of a relatively high number of inputs and technologies, being relatively progressive in adopting changes and make a significant contribution to agriculture production.

2. EMPIRICAL LITERATURE REVIEW

2.1. Information Needs in Agriculture

Unlike in the past, agriculture in the developing world, especially in South Asia, is becoming more knowledge-intensive than resource-intensive (Awuor et al., 2013).

Further, the information needs of farmers have been increased as never before due to the diminishing intervention of government in the sector (Shepherd, 2000). In order to generate an understanding of the information needs of the farmers in the context of developing countries, empirical studies conducted in the recent past were reviewed. Accordingly, market related information has been one of the pressing information of the developing world farmers as reported by Madhavan (2017), Edeoghon & Okoedo-Okojie (2015), Sharma (2014), and Kabir et al., (2014). Input related information such as agrochemicals, fertilizer, planting materials, transport, and labour have also been recorded as prioritized information needs of the farmers in developing countries (Madhavan, 2017; Edeoghon & Okoedo-Okojie, 2015; Sharma, 2014; and Kabir et al., 2014; and Omoregbee and Banmeke, 2014). Information on crop production technology and animal husbandry have been identified as another main information category sough by the farmers (Madhavan, 2017; Edeoghon & Okoedo-Okojie, 2015; Sharma, 2014 and (Mohammad & Shweta, 2014)). According to Madhavan (2017) and Kumar (2014), finance related information, government and non-government supporting services were also among the farmers' information needs. Further, the farmers also look for information on weather & climate information, health and safety related information (Sharma, 2014 and Bhagachand, 2012). The analysis of these studies revealed that farmers in the developing countries look for a variety of information to make their farming decisions and the priority list of the information need is varied across the countries.

2.2. Modern Sources of Information in Agriculture

Farmers use a variety of information sources to access information including personal localite sources, personal cosmopolite sources and mass media sources. Accordingly, traditional and interpersonal sources like face-to-face contacts, group contacts, and demonstrations and traditional mass media sources like print media, radio and television are among the most popular sources (Kughur et al., 2014). However, at present, ICT has tremendously influenced the form and function of agricultural information sources and channels (Aker, 2011; Brewster et al., 2012; Qaisar et al., 2011), so that mobile phones, computers and the internet based modern mass media sources are becoming popular among farmers. Thus, farmers' access to information in developed countries has transformed through the increased digitization of industry and government information and other supportive services (Starasts, 2015), but the adoption of ICT applications in developing world agriculture has been hindered by a set of design-related, economic and socio-cultural factors (Aubert et al., 2012; Khalil Moghaddam and Khatoon-Abadi, 2013). Several studies have been carried out to investigate the adoption of modern media in the context of developing world agriculture. Dissanayake and Wanigasundere (2014) reported that the majority of farmers use mobile phones to communicate input suppliers, buyers, agriculture extension officers and other farmers. In another study, Adikari (2014) reported that among the mass media sources used by the farmers in Sri Lanka, television ranked first followed by radio and printed media respectively. Kumar (2014) and Bhagachand (2012) have reported that radio and television were among the main information sources used by Indian farmers. However, the use of modern mass media sources like ICT based information systems and the internet reported to be very low among the farmers in developing countries (Kaila & Tarp, 2019; Evans, 2018 and Aldosari, et al., 2017).

2.3. Farmers Perception on Modern Sources of Information

Over the last couple of decades, ICT based modern information sources have been adapted in accessing the agriculture information in both developed and developing world agriculture to a different degree. Numerous studies have been carried out in the developing world to explore the perception of farmers, the rate of adoption and factors affecting the adoption of ICT for agriculture. A recent study in Pakistan by Aldosari, et al., (2017) reported that the majority of respondents were agreed that mobile and internet can be a useful source of agricultural information while Kante et al., (2017) exposed that more than 95 percent of respondent farmers in Mali believed that ICT could be a driver for accessing agriculture information. In evaluating the farmers' response towards an initial agriculture information dissemination mobile prototype in Sri Lanka by Lasanthi et al., (2013) disclosed that the farmer group strongly endorsed the usability of the prototype.

3. METHODOLOGY

3.1. Research Design

The survey research methodology was used in the study where a structured questionnaire was prepared to collect the primary data referring to the previous studies of this nature (Kaila & Tarp, 2019; Evans, 2018; Aldosari, et al., 2017; Madhavan, 2017; Edeoghon & Okoedo-Okojie, 2015; Sharma, 2014; and Kabir et al., 2014; Dissanayake & Wanigasundere, 2014, Adikari, 2014; Omoregbee and Banmeke, 2014; Kumar, 2014; De Silva et al., 2012 and Bhagachand, 2012). The first section of the questionnaire was dedicated to inquiring about the demographic information of the respondents and the second section was comprised of questions inquiring about the different modern information sources used by the respondents. The last section carried the questions inquiring the perception of respondents about the modern information sources. The questionnaire was pretested with 20 vegetable farmers from the intended population. According to the results of the pre-test, a couple of questions were modified to make them clearer to the intended respondents.

3.2. Sampling, Data Collection and Analysis

Commercial vegetable cultivation takes place all over the country at different scales. However, two major vegetable growing zones can be identified as upcountry cultivations and low country cultivations. Accordingly, the stratified random sampling techniques were used to recruit representative samples from the two zones. Vegetable farmer lists of two zones were obtained from the field officers of the Department of Agriculture and considering the proportion of vegetable farmers operating in each zone (65 percent from low-country and 35 percent from up-country) 200 farmers from the low-country zone and 125 farmers from upcountry zones were recruited randomly. Then, the data collection was conducted using the refined questionnaire and 170 questionnaires from low-country zone and 105 questionnaires from up-country zone were completed. The collected data were descriptively analysed and interpreted to ascertain the set objectives of the study.

4. RESULTS AND DISCUSSION

4.1. Demographic Information

The demographic characteristics of the respondent farmers are presented in Table 4.1. According to findings, the majority of farmers were male (84 percent), about 61 percent of farmers were in the 35-55 year age category and notably, there was about 20 percent of elderly farmers above 55 years. When considers the level of education, 36 percent have attended school maximum up to grade 8, nearly a half of the respondent farmers have studied up to Ordinary Levels (OLs) examination while 16 percent have studied up or above Advanced Levels (ALs) examination. Data further revealed that a majority of farmers (79 percent) possessed above 15 years of farming experience. Telecommunication usage statistics showed that a majority of farmers (above 86 percent) use radio, television and mobile phones. When reflecting on the demographic profile of the respondent farmers, particularly concerning the gender, age and education statistics, there would be less propensity to use modern information sources.

Table 4.1: Demographic profile of the respondent farmers (N=275)

Variable	Sample Statistics
Gender	
Male	84.0 %
Female	16.0%
Age Distribution (Yrs.)	
Below 35	18.9 %
35 to 55	61.5%
Above 55	19.6%
Level of Education	
Less than grade 8	36.0%
Sat for Ordinary Levels (OLs)	48.0%
Sat for Advanced Level (ALs)	16.0%
Farming Experience (Yrs.)	
Less than 5	11.0%
6-15	10.0%
Above 15	79.0%
Telecommunication use	
Radio	88.3%
Television	92.0%
Mobile phones	86.5%
Fixed Phones	39.2%
Internet	7.6%

4.2. Usage of Mobile phones

4.2.1. The extent of use of mobile phones

According to the survey findings (Table 4.2), a great majority of (87 percent) respondent farmers use mobile phones for farming and day-to-day communication. Out of the mobile users, about 92 percent use standard mobile phones, and only 8 percent possess smartphones. When it comes to mobile phone ownership, almost 82 percent use their own mobile phone, and about 18 percent use someone else mobile phone. Amazingly 98 percent of the respondent farmers own pre-paid connections. When inquiring about the level of satisfaction in accessing farming information through mobile phones, almost half of the respondent farmers indicated that they are not satisfied. With regards to the experience of using a mobile phone, almost half of the respondents indicated that they have been using a mobile phone for more than 6 years, about 27 percent have 3 to 6 years of experience and another 22 percent got 1 to 3 years of experience in mobile phone use.

As reported in the study, mobile phone usage of the farmers is considerably high but a majority of farmers use standard or regular mobile phones which are not capable of giving access to the internet and exchanging multimedia contents. Adikari (2014), Dissanayake & Wanigasundara (2014) and De Silva et al., (2013) have reported similar findings in their studies conducted with Sri Lankan farmers. Consequently, this can be seen as one of the major constraints in limiting the use of modern media sources by the farmers.

Table 4.2: Mobile phones usage statistics

Mobile phones usage (N=275)	**Yes (%)**	**No (%)**
	87 (239)	13 (36)
Type of Mobile phone use (N=239)	**Standard Phone (%)**	**Smart Phone (%)**
	92 (219)	8 (20)
Ownership of Mobile phone (N=239)	**Owned (%)**	**Others' (%)**
	82 (196)	18 (43)
Package type (N=239)	**Pre-Paid (%)**	**Post Paid (%)**
	98 (234)	2 (5)
Years of experience in using mobile phones (N=239)	**Years of experience**	**Occurrence (%)**
	Less than one year	3.7 (09)
	More than one year up to three years	22.0 (53)
	More than three years up to six years	27.0 (64)
	More than six years	47.3 (113)

4.2.2. Functional abilities of mobile phones use

When assessing the respondent farmers' ability to operate common functionalities of a mobile phone (Table 4.3), everybody indicated that they can make voice calls on their own, about half of the respondents use SMS and about 42 percent can take a picture and capture video using their mobile phones. It further revealed that only 16 percent use their mobile phone to access the internet. Also, the findings revealed that the ability of the respondent farmers to use social media portals, bill payment, and e-mail was relatively low. Bodhikotuwa et al., (2012) have made similar observations in studying the Sri Lankan farmers while Ganesan et al., (2012) have also reported a similar type of hindrances of mobile phone usage in developing countries. Thus, findings indicate that the functional ability of the farmers could have a great influence on the adoption of modern communication technologies.

Table 4.3: Functional abilities of mobile phones use (N=239)

Function	**User ability**	
	Yes (%)	**No (%)**
Making voice call	100 (239)	0 (0)
Use of SMS	55 (132)	45 (107)
Taking pictures/videos	42 (100)	58 (139)
Accessing Agri-info services	28 (67)	72 (172)
Use of mobile internet	16 (37)	84 (202)
Use of social media portals	10 (24)	90 (215)
Use of utility bill payments	9 (21)	91 (218)
Use of email	8 (20)	92 (219)

4.2.3. Problems faced in using mobile phones

The survey further inquired about the problems faced by the respondent farmers in using mobile phones by calculating the problem score (high = 3, moderate 2, low =1). As per the survey findings (Table 4.4), the top most severe problems faced by the respondent farmers were the cost of mobile phones (rank 1), operational issues (rank 2), and signal reception issues (rank 3). Then, the battery charging, physical damages, repairing issues, and call rates were ranked at 4, 5,6 and 7 positions respectively. The least severe problems reported by the farmers were the absence of dedicated packages for farmers, cash reloading/topping up, and loss of phones respectively. Jayathilake *et al.*, (2011) also reported a set of similar problems faced by Sri Lankan farmers in using mobile and other ICT tools. These findings suggest that farmers faced greater difficulty in purchasing mobile phones, particularly smartphones due to high prices. Further, operational issues faced in using the mobile phones and poor

reception were other two major issues. These findings provide testimony to the low usage rate of smartphones by the farmers.

Table 4.4: Problems faced in using mobile phones (N=239)

Problem	Occurrence			Problem Score / rank
	Low	Moderate	High	
Cost of phone	42	107	90	526 (1)
Operational issues	31	202	6	453 (2)
Signal/Reception issues	65	143	31	444 (3)
Battery/charging issues	45	188	6	439 (4)
Physical Damages	64	169	6	420 (5)
Repairing issues	96	111	32	414 (6)
Call rates	105	100	34	407 (7)
No dedicated packages for farmers	131	50	58	405 (8)
Loss of phone / Stealing	129	109	1	350 (9)
Toping up/ Reloading	146	85	8	340 (10)

4.2.4. Types of information accessed using mobile phones

The survey assessed the types of information accessed by the farmers using mobile phones computing the usage score (Frequently =2, Occasionally =1, Never = 0). According to the findings (Table 4.5.), the market prices of crops (rank 1) and information on buyers, collections and traders (rank 2) were the most frequently sought information by the farmers. Production input related information such as fertilizer, pest and disease control methods, labour, planting materials, transport, agrochemicals, government support programs and financing information were ranked from rank 3 to rank 10 respectively. Information on new farming methods, non-governmental services, weather and health were reported as the least sought information through mobile phones. More or less similar findings have been reported by Adikari (2014), Dissanayake & Wanigasundara (2014) and De Silva et al., (2013) in studying the use of mass media and mobile based information systems by Sri Lankan farmers. Accordingly, product marketing information and information on inputs were the mostly accessed information by the farmers using their mobile phones.

Table 4.5: Types of information accessed using mobile phones (N=239)

Types of information	Usage			Usage Score / rank
	Frequently	Occasionally	Never	
Market prices for specific crops in specific markets	141	56	42	338 (1)
Information on buyers, collectors and traders	62	58	119	182 (2)
Fertilizer market information	31	44	164	106 (3)
Pest and diseases and controlling methods	25	64	150	114 (4)
Labour information in the locality	27	42	170	96 (5)
Seeds/planting materials	25	45	169	95 (6)
Information on transportation	7	73	159	87 (7)
Agrochemicals	10	40	189	60 (8)
Information on government supports	6	38	195	50 (9)
Financing information	3	39	197	45 (10)
New farming methods, equipment and tools	6	33	200	45 (11)
Information on non-government services	4	20	215	28 (12)
Weather information	5	15	219	25 (13)
Health and safety information related to occupational diseases	5	13	221	23 (14)

4.3. Use of Agri-Information services by the farmers

4.3.1. Use of Mobile Mediated Agri-Information services

Even though there are a couple of mobile mediated agri-information services are operating in the country, the study revealed that (Table 4.6) only 13 percent of the respondent farmers use those services. Moreover, more than half of the users were not satisfied with those mobile mediated agri-information services. Conducting an initial evaluation study of an agriculture information dissemination mobile prototype,

De Silva et al., (2013) also reported a similar finding. Thus, these findings indicate that the mobile mediated agri-information services of the country have not been effective and successful in meeting the information demands of the farmers.

Table 4.6: Use of Mobile Mediated Agri-Information services

	Yes (%)	**No (%)**
Use of agri-information services (N=275)	13 (66)	87 (209)
	Satisfied (%)	**Not Satisfied (%)**
Level of satisfaction in obtaining useful farming information (N=66)	44 (29)	56 (37)

4.3.2. Use of Internet to access agriculture related information

When assessing the use of the internet by the farmers, the study found that only 9.5 percent of the farmers use the internet through computers and mobile phones (Table 4.7). However, out of the current users, about 58% indicated that they were not satisfied with the usefulness of obtaining farming information via the internet. These findings are par with the overall telecommunication usage statistics of the country (Table 1.1) and with the findings of Adikari (2014), Dissanayake & Wanigasundara (2014) and De Silva et al., (2013).

Table 4.7: Use of Internet to access agriculture related information

Extent of the internet use (N=275)	**Yes (%)**	**No (%)**
	9.5 (26)	90.5 (249)
Level of satisfaction in obtaining useful farming information from the internet (N=26)	**Satisfied (%)**	**Not Satisfied (%)**
	42 (11)	58 (15)

4.4. Farmers perceptions on modern sources of information

4.4.1. Perception of the usefulness of mobile phone to access agriculture information

According to the survey findings (Table 4.8), nearly 60 percent of the respondent farmers believed that mobile phones can be used to improve their farming activities whereas only 53.5 percent disagreed. Since 60 percent of the farmers were already convinced about the usefulness of mobile phones, there is a good potential to promote and facilitate the farmers to make the best out of mobile phones for their farming. In studying the perception of Pakistani farmers, Khan et al., (2019) has also revealed that the majority of farmers possessed A positive perception towards the efficacy of mobile phones to access agriculture information.

Table 4.8: Perception of the usefulness of mobile phones to access farming related information (N=275)

Statement	**Level of agreement**		
	Agree (%)	**Disagree (%)**	**Undecided (%)**
I believe that mobile phones can be used to improve my farming activities.	59.5 (163)	33.5 (92)	7 (20)

4.4.2. Perception of the usefulness of mobile phones mediated agri-information services to access farming related information

Even though this study revealed that only a smaller number of farmers (13 percent) use the mobile mediated agri-information services at present, the majority of the farmers (65 percent) confessed that the mobile phones mediated agriculture information system can be useful to improve their farming activities (Table 4.9). Another 28.5 percent were unsure, perhaps due to their low awareness and only 6.5 percent disagreed about the usefulness of such information systems. The study of De Silva et al., (2013) has also revealed that the Sri Lanka farmers showed a high interest in using a prolific mobile-mediated agri-information service. Thus, this study findings would be quite interesting and encouraging because this positive perception of farmers about the mobile phones mediated agri-information services can be capitalized to improve the existing information systems or to design and promote new mobile phones mediated agri-information systems.

Table 4.9: Perception of the usefulness of mobile phones mediated agri-information services

Statement	Level of agreement		
	Agree (%)	Disagree (%)	Undecided (%)
I believe that mobile phones mediated agriculture information systems can be useful to improve my farming activities.	65 (179)	6.5 (18)	28.5 (78)

4.4.3. Perception of the usefulness of the internet to access farming-related information

When enquiring about the usefulness of the internet, only 7.6 percent of farmers stated that the internet can be used to improve their farming activities (Table 4.10). Another 16 percent disagreed about the usefulness of the internet while a great majority were undecided. Apart from the low level of internet usage by the farmers, lack of awareness and experience would be the main reasons contributing to their doubtfulness about the efficacy of the internet.

Table 4.10: Perception of the usefulness of the internet to access farming-related information

Statement	Level of agreement		
	Agree (%)	Disagree (%)	Undecided (%)
I believe that the internet can be used to improve my farming activities.	7.6 (21)	16 (44)	76.4 (210)

4.4.4. Willingness to use modern Information services to access farming-related information

According to the survey results (Table 4.11), the majority of respondent farmers (75 percent) indicated that they are willing to use a dedicated modern agriculture information system if developed addressing their pressing information issues. This finding would be very appealing and encouraging within a context of a low rate of smartphone usage (8 percent), a low rate of mobile mediated information systems usage (13 percent) and a low rate of internet usage (9.5 percent). Thus, it indicates that there is a conducive environment to promote demand-driven modern agriculture information systems among farmers.

Table 4.11: Willingness to use modern Information services (N=275)

Statement	Level of agreement	
	Yes (%)	No (%)
I am willing to use a dedicated modern agriculture information system if developed.	75 (207)	25 (68)

4.4.5. Perceived adaptability to use modern information services to access farming-related information

Responding to the question of adaptability, the majority of respondent farmers (77 percent) indicated that if required guidance is given, they can adopt to use modern communication technologies for improving their farming activities (Table 4.12). This disclosure will also be very significant and appealing for an endeavour to promote modern communication technologies among the farming community to improve their productivity.

Table 4.12: Perceived adaptability to use modern Information services (N=275)

Statement	Level of agreement	
	Yes (%)	No (%)
I believe that, if required guidance is given, I can adapt to use modern communication technologies for improving my farming activities.	76.7 (211)	23.3 (64)

4.4.6. Perceived need for training on modern Information services to access farming-related information

Depicting the consistency of their standpoint, the majority of respondent farmers (77 percent) indicated that they wish to have training on the use of modern information systems for agriculture (Table 4.13). This level of preparedness of the respondent farmers would be a very positive sign for promoting modern agriculture information systems successfully.

Table 4.13: Perceived need for training on modern Information services (N=275)

Statement	Level of agreement	
	Yes (%)	No (%)
I wish to have training on the use of modern information systems for agriculture.	79.6 (219)	20.4 (56)

4.5. Influence of demographic factors on famers' perception towards modern source of information

4.5.1. Gender and perception towards the usefulness of mobile mediated agriculture information system to access agriculture information

The Chi-square analysis results (Table 4.14) revealed that the gender has no significant association (X^2(2, N=275) =3.683, p=0.159) with the perception towards the usefulness of mobile mediated agriculture information system. The female counterparts involved in this survey was only 16 percent and they got involved in agriculture as the main breadwinner of the family, thus they are very par with the male counterparts. This could be the underline reason for this finding.

Table 4.14: Chi-square test for the relationship between gender and the perception of usefulness of mobile mediated agriculture information system (N=275)

I believe that mobile phones mediated agriculture information systems can be useful to improve my farming activities.						
	Male	Female	Total	Chi-square	df	p-value
Believed	56.0%	9.1%	65.1%	3.683	2	0.159
Not believed	5.8%	0.7%	6.5%			
Undecided	21.8%	6.5%	28.4%			
Total	83.6%	16.4%	100.0%			

4.5.2. Age and perception towards the usefulness of mobile mediated agriculture information system

When testing the relationship between the age and the perception towards the usefulness of mobile phones to access agriculture information, the Chi-square analysis revealed (Table 4.15) that there is no significant association (X^2(4, N=275) =3.206, p=0.524). Even though the level of adoption of mobile mediated agri-information systems was recorded as very low among the respondent farmers, irrespective of the age a greater majority of farmers use mobile phones as well as hold a positive perception towards such system. This would be the reason for the insignificant relationship between the age and the perception.

Table 4.15: Chi-square test for the relationship between age and the perception of usefulness of mobile mediated agriculture information system (N=275)

I believe that mobile phones mediated agriculture information systems can be useful to improve my farming activities.							
	Below 35 yrs.	35-55 yrs.	Above 55 yrs.	Total	Chi-square	df	p-value
Believed	11.3%	40.4%	13.5%	65.1%	3.206	4	0.524
Not believed	1.8%	4.4%	0.4%	6.5%			
Undecided	5.8%	16.7%	5.8%	28.4%			
Total	18.9%	61.5%	19.6%	100.0%			

4.5.3. Level of Education and perception towards the usefulness of mobile mediated agriculture information system

According to the Chi-square test results (X^2(4, N=275) =27.11, p=0.000), level of education showed a significant relationship with the perception towards the usefulness of mobile mediated agriculture information system. This finding is quite plausible as the education makes one's know-how and comprehension broader so that facilitates rational selections.

Table 4.16: Chi-square test for the relationship between education and the perception of usefulness of mobile mediated agriculture information system (N=275)

I believe that mobile phones mediated agriculture information systems can be useful to improve my farming activities.							
	Up to G8	Up to OLs	Above ALs	Total	Chi-square	df	p-value
Believed	20.0%	29.1%	16.0%	65.1%	27.11	4	0.000*
Not believed	2.2%	4.0%	0.4%	6.5%			
Undecided	13.5%	14.7%	0.2%	28.4%			
Total	35.6%	47.8%	16.6%	100.0%			

5. CONCLUSIONS

A considerably high percentage of farmers use mobile phones but smartphone usage is significantly low. Then, the high cost of smartphones, low functional abilities, operational difficulties, and poor reception have significantly affected the mobile phone usage of the farmers. Market information, particularly the prices of agri-produce and inputs prices and availability are the main types of information accessed by the farmers using mobile phones. However, the farmers are not satisfied with the efficacy of the present mobile-mediated agriculture information systems of the country thus their usage rate is very low. The internet usage of the farmers was significantly low. Even with the low rate of smartphone usage, low functional abilities, and low level of satisfaction about the current agri-information systems, farmers are convinced about the usefulness of mobile mediated agriculture information systems. Further, it revealed that the level of education showed a significant relationship with the positive perception towards mobile mediated agriculture information systems but not with the gender and age. It also exposed that the farmers are confident that they can adapt to modern information systems and for that, they are prepared to receive the required training. As a whole, despite the low level of current usage, there is a huge potential to promote modern agriculture information systems among the farmers of the country.

In the light of study findings, it is suggested to facilitate the farmers to use smartphones by deploying necessary financial, technical and emotional support which would be paramount important to promote the use of modern information systems among the farmers of the country. It also recommends carrying out further studies to identify the information needs of the farmers and their information-seeking behaviour that would generate essential inputs to modify the existing agri-information systems and to design new agri-information systems to cater to the information needs of the farmers effectively and efficiently.

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