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Challenges in Usage of Mobile Phone Regarding Agricultural and Marketing Information among Farmers in Sindh, Pakistan

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Abstract

Objective: This study was conducted to discover the farmers' behavioral intention to use mobile phones for agricultural information and how mobile phones impact farmers' abilities to obtain the latest weather and market information. **Method:** In this way, this study surveyed 1500 farmers in ten districts of Sindh, Pakistan, 150 from each district. The list was obtained from Sindh Government Agriculture Department and Sindh Irrigation & Drainage Authority (SIDA). **Findings:** The results mentioned that 97.3% respondents own their personal mobile phone and 64.5% of the respondents call to the market directly for seeking crop information. Moreover, in Sindh, Pakistan, farmers make use of mobile phones to keep current with the market; contact buyers and very limited 7.9% of the respondents get weather information. In some places information and communication technology disseminates information rapidly around the world to the benefit of many communities. Furthermore, the farmers were found unaware of the proper mobile phone usage. **Improvements:** Therefore, there is still a need to enhance farmers' capacity for new technology and provide new opportunities and facilities to farmers for enhance their product.

Keywords: Agriculture Development, Farmers, Marketing, Mobile Phone

1. Introduction

Information and communication technology plays a vital role in bringing development in education, health and agriculture in under developing countries. As per International Telecommunication Union (ITU), the technical development, infrastructure deployment, and decreasing prices of mobile phones have put surprising increase in access and connectivity to billions of human beings around the globe. It is documented that in 2015, there were higher than 7 billion cellular subscriptions in all over the world[1]. Pakistan is an agricultural country where greater than 70% people live in remote areas and the main source of their revenue comes from agriculture, which contributes greater than 25% of the Gross Domestic Product (GDP). Agriculture supplies 45% labour force and employs more than 70% of the population directly or indirectly. Another study showed that access to market prices has improved the standard of living for farmers in rural areas and improved their livelihoods[2,3]. Different communication technology toolslike computers, internet, television radio and mobile phones can be used to transmit information regarding the use of pesticides, marketing and the weather; similarly, farmers keep up-to-date by using the internet and connecting with the market to obtain the latest price information.

They can also sell their products online through the proper use of ICTs. Information related services for farmers both national and regional level could provide new opportunities for famers to increase their income. The ICTs have changed the traditional methods of agriculture and improved agriculture production and sustainability[4,6]. In recent time, there happened a quickgrowth in mobile

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phone subscription in India, Pakistan, and Bangladesh, where mobile phones are fastest growing industries in the world over. Today, educated farmers are using Short Message Service (SMS) and connect with friends and family in addition to buyers and brokers for negotiating the price of their products[7]. Mobile phones at great extent have decreased information and communication costs for the residents of rural area. It has given latest information to farmers to obtain knowledge regarding agricultural issues and also mobile phones have opened up a new path through which to develop agriculture[8].

2. Research Problem

In Pakistan, it is frequently difficult for rural people to trade and sell their products in markets, which are often far from their farms; inconvenient transportation also creates problems for getting goods to market on time. Furthermore, the lack of ICT services in their area means farmers cannot obtain proper prices for their product, forcing them to sell too low to make a profit. These difficulties affect farmers planning to sell their crops in market and selecting good route for shipment[9]. Most farmers cannot access information about markets, including prices, marketing policies, or where to find good buyers and brokers, all of which create significant difficulties for farmers in developing countries. It has been shown; however, that information and access to mobile phones among rural farmers improved their performance and market efficiency in developing countries[10,11].

3. Survey of Literature

ICTs are speedily transforming agricultural information in developing and industrialized countries. Most of the events and activities related with agricultural market place are now facilitated by databases based on web linked indicating prices, product quality, and quantities. Different communication technology tools exist to enable farmers to approach credit, official programmes and technical support under various finance modes. In this way, crops, livestock and business development services are possible to be found, bought, and paid for through Internet, easily. According to the Pakistan Telecommunication Authority (PTA), there are approximately 136 million mobile phone users in Pakistan serviced by five companies: Mobilink, UFone, Telenor, Warid and Zong. The same report stated that total number of 3G/4G service users have stood 24.709 million by the end of January 2016[12]. In various studies it has been found that those farmers who use Internet by mobile phone to have reached to market prices are able to negotiate more effectively with traders for suitable prices. These farmers take more informed market related decisions regarding. ICTs perform a vital role in different sectors of society such as agriculture. Today's farmers are key players in agriculture using technologies to develop their crops and increase their productivity. Moreover, farmers now engaged in commercial agriculture on a large scale using different communication technology tools, while those who engage in agriculture utilize various other forms of ICT like computers and Internet[13].

4. Mobile Phones and Agriculture Development

The applications of communication related technologies for the uplift of agriculture are important to increase farmers' agricultural capacity. Mobile phones have played vital role in enhancing farmers' knowledge about agriculture, and supporting rural development in developing countries. There is no doubt that knowledge and information are the most important factors in making agricultural choices regarding increasing marketing, finance, and production. Today, however farmers can easily communicate with buyers to obtain the latest prices for their product in developing countries in regions from southern Africa to Asia[14]. A study conducted in Kerala, India to investigate adoption of mobile phones by fisher folk to contact customers found that fishermen increased their income up to ten percent by using mobile phones. Another study conducted in Niger showed that mobile phones brought significant changes to the market price of grain[15]. Studies conducted in various countries have shown that mobile phones have improved farmers' agricultural productivity. Infrastructure facilities have also given farmers' new opportunities and access to contact with buyers and obtain the latest information about their goods. In villages, mobile phones have brought significant changes and have had a strong impact on market selection[16-19]

5. Objectives

- To determine the usage of mobile phone for agriculture information among farmers in Sindh province, Pakistan.
- To assess determinant effects of mobile phone for marketing purpose and weather related information among farmers in Sindh province, Pakistan.

6. Methodology

The quantitative approach was used for this study. This study was conducted in agricultural areas of Sindh. Geographically, Sindh is distributed into three parts, upper, middle and lower by agricultural locations. Out of 24 districts of Sindh the most agriculturally cultivated ten districts were randomly selected for data collection and simple random sampling was used for this study. A total of 1500 survey participants were randomly taken from the ten districts of Sindh, Pakistan: Ghotki, Larkana, Khairpur, Badin, Thatta Sijawal Benzairabad, Jamshoro, Matiari and Tando Allahyar. These districts were distributed into all three parts and 150 respondents were selected from each district from the list of farmers supplied by the Government of Sindh Agriculture Department and SIDA. Six districts were selected from upper and middle namely Ghotki, Larkana and Khairpur; four districts were selected from the middle, namely Benzairabad, Jamshoro and Matiari; and four districts were selected from the lower part: Tando Allahyar, Thatta, Badin and Sijawal were randomly selected for data collection. Three enumerators were hired for the collection of data that was collected from farmers working in the fields. The researchers wrote a letter to Sindh's Agriculture Department after obtaining the list of farmers to inform the agriculture extension officers regarding data collection. The objective of this research was to assess the usage of behaviour intention regarding the adoption of mobile phones for agriculture information and effective use of mobile phones on information gathering about market and weather related information among farmers in Sindh province, Pakistan.

7. Results and Discussion

Table 1 shows that one hundred percent of the 1500 respondents were male; although women also work in agriculture; however none participated in the study. Regarding age, over than two fifths of the respondents (41.3%) were aged between 31 and 40 years old; whereas 29.3% respondents were aged 20 to 30 years, 19.2% were aged 41 to 50 years, 6.8% were over 50 and only 3.4% were under 20, while the mean value was M- 2.99 SD, 995 (Table 1). About qualification the result indicates that 35.1% respondents were illiterate; whereas 22.8% had a primary education, 13.4% had an intermediate education, 12.5% had a middle school education, 9.4% had passed high school and 6.8% had obtained bachelors or masters degrees. Regarding monthly income, 50.3% respondents' earned less than ten thousand rupees, 30.3% earned 11 to 15 thousand rupees per month, 14.7% earned 16 to

Table 1. Demographic profile

Variables	Frequency	Percentage	Mean	Std
Gender				
Male	1500	100		
Female	0	0.0		
Monthly income				
< 10 thousand Rupees	755	50.3	1.74	.875
11-15 thousand	455	30.3	.	
16-20 thousand	221	14.7		
More than 20 thousand	69	4.6		
Occupation				
Farming	998	66.5	1.50	.761
Govt job & Farming	255	17.0		
Farming & Own business	247	16.5		

Table 2. Mobile phone for agriculture information

Variable	Frequency	Percentage
Having personal mobile phone		
Yes	1459	97.3
No	41	2.7
Communication mode with buyers		
Direct call	967	64.5
SMS		
MMS	11	.7
Miscall	128	8.5
Never call	406	27.1
Using mobile phone for crop price information		
Yes	642	42.8
No	364	24.3
Some times	494	32.9
Calling agriculture-officers for pesticide information		
Yes	367	24.5
No	597	39.8
Some times	536	35.7
Calling for weather information		
Yes	118	7.9
No	1116	74.4
Some times	266	17.7
Using mobile phone at work place?		
Yes	652	43.5
No	208	13.9
Some times	640	42.7

20 thousand rupees, and only 4.6% of the respondents' had incomes exceeding 20 thousand per month.

As shown in Table 2, 97.3% respondents had their personal mobile phone. The respondents were also asked about the use of mobile phone regarding agriculture information, and it was found around 65% respondents call buyers directly to get information about different crops prices and negotiate to sell their products it was showed that farmers focus and make their target to sell their product near market to save their transport expenses. A further 27.1% of respondents never call buyers, while around 14% respondents communicate with buyers via text messages (SMS). However, 9% of the users were miss-calling to buyers because of a lack of credit on their mobile phone. The study was conducted in Pakistan by[20] found that famers understand that the advancement of mobile phones has increased their productivity, access to markets and ability to bargain with buyers. Many different studies in less developing countries indicated that usage of mobile phone to gather agricultural knowledge and marketing information to sell their product was positive[21-27]. The respondents were also asked if they monitor the market through mobile phone use, and 42.8% of respondents said they communicate with shopkeepers and obtain market information about different crops such as cotton and wheat. Another 33% of the respondents occasionally call retailers for information about vegetables, rice and other crops. A further 24.3% of respondents did not call the market for information; whether respondents did call depended mostly on their fellow farmers and their landlords to keep up to date about crop prices.

As shown in Table 2, respondents were asked about their contact with agriculture or pesticide officers about the use of seeds and pesticides. The results showed that 39.8% of respondents did not call and obtain this information due to a lack of education. An additional 36% of the respondents occasionally contact extension officers about the use of pesticides and to obtain information about different crop diseases, while 24.5% of respondents did not call either officer for agriculture and pesticide information. Regarding weather information, 74.4% of respondents did not call meteorological departments about weather information; only 17.7% of the respondents call and acquire weather information. Only 7.9% of respondents call metrological departments to obtain weather information, most often land owners, and whereas farmers mostly depend on mass media (see Table 2). The respondents were also asked how frequently they use mobile phones at work. The results showed that 43.5% of respondents call family and friends for non-work reasons, while 43% of the respondents call family members to bring meals, pesticides or seeds. Only 14% of the respondents did not call any family members or friends during work.

Table 3 shows the results of multiple regressions regarding the determinants of the use of mobile phones for agricultural information in the future by farmers. According to results, excepting the age of respondents (β = -0.050, p = 0.058), all other factors significantly contributed towards the farmer's decision to use mobile phones to obtain agricultural information in the future. Among the contributing factors, level of education

Table 3. Determinants of the use of mobile phones for agriculture information

Independent Variables	Std Error	Beta	T	sig
Constant	.084	3.533	41.9	.000
Age	.024	-.050	-1.90	.058
Education	.009	-.111	-4.41	.000
Monthly income	.027	.230	8.684	.000
Compute Perform expectancy	.006	.251	10.2	.000
Compute Efforts expectancy	.010	.243	9.741	.000
Compute Social influence	.011	.278	11.542	.000
Compute Facilitating condition	.007	.164	6.56	.000

(β = -0.111, $p < 0.001$) contributed negatively towards the use of mobile phones, i.e., the low literacy level among the farming community was a major hindrance to the use of mobile phones by farmers. Other determinants, however, namely monthly income (β = 0.230, $p < 0.001$), performance expectancy (β = 0.251, $p <$ 0.001), efforts expectancy (β = 0.243, $p < 0.001$), social influence (β = 0.278, $p < 0.001$) and facilitating conditions (β = 0.164, $p < 0.001$) contributed positively to the use of mobile phones by farmers to obtain agricultural information as they found the use of mobile phones to boost their income by improving their performance. Data from Table 3 regarding the determinants for the use of mobile phones by farmers for marketing that except for level of education (β = 0.021, p = 0.433), all other variables exhibited a significant contribution (Table 3). The age of the respondent farmers showed a negative but significant contribution (β = -0.96, $p < 0.001$) towards the decision to use mobile phones, i.e., young farmers were found to be more active in using mobile phones to obtain relevant marketing information in comparison to older farmers. All remaining variables, i.e., monthly income (β = 0.100, $p < 0.001$), performance expectancy (β = 0.227, $p < 0.001$), efforts expectancy (β = 0.202, $p < 0.001$), social influence (β = 0.372, $p < 0.001$) and facilitating conditions (β = 0.191, $p < 0.001$) were pos itive determinants of the use of mobile phones by farmers. The positive contribution of the above mentioned variables was mainly due to the enhanced performance in the shape of increased monthly income of farmers due to the facilitating conditions by the government and social influence from the family and friends.

Table 4 showed the results for the determinants of contacting buyers via mobile phone. The results indicate that level of education (β = -.099, p > = 0.222) did not influence farmers to use mobile phones to contact their buyers; however, a significant but negative effect of age of farmers (β = -.032, p =. < 0.001) was recorded. All other factors, i.e., monthly income (β =. 214, p = > 0.001), performance expectancy (β = .198, p= > 0.001), efforts expectancy (β = .167, p = > 0.001), social influence (.232, p = > 0.001) and facilitating conditions (β = .093, p = > 0.001) showed a highly significant effect on the use of mobile phones by farmers to contact their buyers. Furthermore, farmers earn higher profit margins by using mobiles to contact buyers at various markets; accordingly, a positive outcome of improved use was recorded for the performance and effort expectancy of the farmers due

Table 4. Determinants to contact with buyers by using mobile phone

Independent Variables	Std Error	Beta	T	sig
Constant	.092		38.524	.000
Age	.010	-.099	-3.924	.000
Education	.026	-.032	-1.222	.222
Monthly income	.030	.214	8.045	.000
Compute Perform expectancy	.006	.198	7.941	.000
Compute Efforts expectancy	.011	.167	6.554	.000
Compute Social influence	.012	.232	9.484	.000
Compute Facilitating condition	.008	.093	3.645	.000

Table 5. Determinants to predict the use of mobile phone for getting latest agriculture and weather information

Independent Variables	Std Error	Beta	T	Sig
Constant	.090		37.252	.000
Age	.026	.002	.081	.935
Education	.010	-.072	-2.845	.005
Monthly income	.029	.194	7.249	.000
Compute Perform expectancy	.006	.151	5.953	.000
Compute Efforts expectancy	.011	.199	7.801	.000
Compute Social influence	.012	.298	12.302	.000
Compute Facilitating condition	.008	.075	2.949	.003

to social pressure from their family and friends. Data in Table 5 shows the multiple regression results for various determinants of using mobile phones among farmers for getting latest information. No significant role of age among farmers was determined in the use of mobile phones (β = -.002, p = .935); however, other determinants contributed significantly towards the use of mobile phones. Farmers' education level showed a weak and significant but negative relationship (β = -0.072, p = .005), indicating that highly educated farmers did not generally depend on mobile phones to obtain the desired information, instead directly searching for the relevant data on the Internet using their computers or laptops. Other factors, however, including monthly income (β = .194, p = < 0.001), performance expectancy (= .151 p < 0.001), efforts expectancy (β = .199, p < 0.001) and social influence (β = .298, p < 0.001) contributed significantly towards the increased use of mobile phones by farmers to obtain agricultural and weather information.

The reason identified for the enhanced use of mobile phones is that farmers' overall performance was improved by getting timely information at their work place. Considering, the above, not only farmers themselves but also their family and friends push farmers to use mobile phones to obtain the latest and most relevant information regarding their crops. Moreover, presence of networks from the service providers and market facilities by the government and other allied agencies also contributed in a very weak, significant and positive way (β = .075 p < 0.003). In India, farmers also contact the meteorological office before starting work. Mobile phones have helped save farmers' time and protect their crops from hard with up to date information about the weather (Ballantyne, 2009; Patil, 2008).

Table 6 shows results regarding the use of mobile phones to contact agriculture officers to obtain information about pesticide use and indicates that the age of respondents showed a positive, highly significant but very weak relationship (β = .127, p < 0.001). It indicated that farmers have realized that mobile phones can be useful to obtain related and timely information about pesticide use to schedule their pesticide sprays properly. Accordingly, monthly income (β = -0.154, p < 0.001) showed a highly significant, weak and negative relationship with use of mobile phones, whereas facilitating conditions elicited a non-significant relationship (β = -0.005, p = 0.861). Performance expectancy (β = -.077, p = .003), effort expectancy (β = -0.094, p>0.0.001) and social influence

Table 6. Determinants to call agriculture officers for pesticide information

Independent Variables	Std Error	Beta	T	Sig
Constant	.073		28.544	.000
Age	.021	.127	4.715	.000
Education	.008	-.031	-1.202	.229
Monthly income	.024	-.154	-5.680	.000
Compute Perform expectancy	.005	-.077	-2.985	.003
Compute Efforts expectancy	.009	-.094	-3.577	.000
Compute Social influence	.010	-.076	-2.969	.003
Compute Facilitating condition	.007	-.005	-.175	.861

Table 7. Determinants to call for getting meteorological information

Independent Variables	Std Error	Beta	t	Sig
Constant	.048		41.861	.000
Age	.014	.089	3.291	.001
Education	.005	-.076	-2.921	.004
Monthly income	.015	.034	1.234	.217
Compute Perform expectancy	.003	.020	.788	.431
Compute Efforts expectancy	.006	.034	1.280	.201
Compute Social influence	.006	-.065	-2.514	.012
Compute Facilitating condition	.004	.062	2.375	.018

(β = -.076, p= .003) showed a highly significant but very weak and negative relationship with the use of mobile phones to obtain information from agriculture officers regarding pesticides spray.

Table 7 shows the results about determinants of calling meteorological departments for weather information. The result indicated that age of respondents showed a highly significant, very weak and positive relationship (β = 0.089, p<0.001), while level of education exhibited a very weak, negative but significant relationship (β = -.076, p = .004) with the farmers use mobile phones to get information from meteorological department. Similar to other results, experienced farmers wanted to obtain information from meteorological department while educated farmers also obtain such data from online sources; hence, fewer of them depend on mobile phones. Accordingly, no significant impact of the use of mobile phones on the monthly income of farmers was recorded (β = .034, p= 0.217). The use of mobile phones by farmers also showed a non-significant relationship with performance expectancy (β =. 020, p = .431) and efforts expectancy (β = .034, p= .201); considering the lack of impact on their monthly income, most farmers did not make concrete efforts to exploit mobile phones to obtain weather information before using pesticides. The results indicated that farmers' social circles (β = -0.065, p = .012) sought to encourage the use of mobile phones to obtain such data considering the availability of meteorological stations and other facilities near their business places (β = .062, p= .018). In India, farmers lack guidelines about how to obtain weather information from the appropriate department, and also have no knowledge of the contact number (Patel, 2008). The results indicated that education level of farmers did not show any effect on the use of mobiles by farmers at their working place; however a highly significant, weak and positive influence of age (β = .116, p <0.001) and negative influence of monthly income β = -.160, p = .0.001) was found. Such demographic results indicated that older, experienced farmers tried to use mobile phones at their work places for different farming tasks, but considering their low income and the lack of a positive impact, opted to restrict their mobile phone use. Moreover, no significant role of social influence (β =-.020, p = .441) and facilitating conditions β = -.009, p = .727) were recorded.

It has been observed that the study areas are the backward areas of Sindh province and lack many basic infrastructure facilities, including proper coverage from the mobile service providers (Kapoor, 2014).

8. Conclusion

While most of the farmers surveyed were uneducated and had low-income, they were interested in using mobile phones to obtain agriculture information and connect with markets. Moreover, farmers were unaware about how to keep up to date with weather information by using mobile phones. In this context, the Pakistani government has opened a few meteorological departments in large cities where farmers have no use for them. It is therefore, important that the government create markets in towns and villages where farmers can easily sell their products at good prices. People were more interested in using mobile phone for agriculture information in future, keep up to date with crop prices and keep in touch with buyers. In some places, a lack of mobile services was the problem, preventing farmers from connecting with family and friends due to poor signals. The overall results showed positive signs for farmers using mobile phones to increase their productivity and improve their income. Furthermore, it is needed that government should open markets near the rural areas of the different areas of Sindh, while also necessary to establish meterological offices at

town level for easier communication as famers can keep up -to - date about weather conditions.

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