Journal of Experimental Biology and Agricultural Sciences

<http://www.jebas.org>

ISSN No. 2320 – 8694

USE OF CELL PHONES BY THE FARMERS AS AN EXTENSION TOOL TO PRACTICE SUSTAINABLE AGRICULTURE AND ACHIEVE FOOD SECURITY IN THE KINGDOM OF SAUDI ARABIA

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Received – Feb 26, 2017; Revision – April 12, 2017; Accepted – April 15, 2017
Available Online – August 31, 2017

DOI: [http://dx.doi.org/10.18006/2017.5\(Spl-1-SAFSAW\).S91.S98](http://dx.doi.org/10.18006/2017.5(Spl-1-SAFSAW).S91.S98)

KEYWORDS

Extension Education

Information dissemination

Sustainable Agriculture

Al-Delam farmers

Cell phone

ABSTRACT

This study sought to identify how farmers used mobile technology as an extension tool in the area of Al-Delam, Saudi Arabia. The study population consisting of 277 farmers was drawn using face to face interview. Well-structured, pre-tested questionnaires were used to collect data. Results of the study are based on questionnaires completed in all respects by 196 participants (70.1% of total). Data were analyzed using SPSS. Results of study revealed that approximately 77% of respondents were using mobile as an extension tool continuously (in routine) and about 68% of the respondents were of the opinion that cell phone helped them meeting their needs and achieving their goals related to agriculture. However, approximately 77% of farmers did not subscribe to any extension services and about 67% intended to subscribe in the near future. Regarding the use of the cell phones for agricultural purposes, about 60% farmers were using them to determine the price of agricultural inputs (e.g. seeds, fertilizers, and pesticides). The study also revealed that about 50% farmers used their cell phones to obtain information through calls, SMS and WhatsApp with the means of 2.86, 2.40 and 2.31, respectively on a 1 to 5 scale. The study concluded that the different categories of the farmers were meeting their needs for agricultural information from different information sources. However, the study showed a positive and significant correlation between larger farmers and the use of cell phone as an extension tool to seek agricultural information at the significance level of 0.01.

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Peer review under responsibility of Journal of Experimental Biology and Agricultural Sciences.

Production and Hosting by Horizon Publisher India [HPI]
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1 Introduction

In a new paradigm, cell phone users have increased exponentially. There were 6.8 billion cell phone subscribers in 2012 globally, according to International Telecommunication Union (2003) estimation. During the last decade, Information Communication Technologies (ICT) did receive significant attention and had a multi-dimensional positive impact on agriculture and rural poverty reduction in the remote areas (Bhavnani et al., 2008; Leye, 2009). ICT has proved to overcome traditional extension systems barriers by enhancing inter-personal connections and increasing their access to information about local markets for price and input availability, ebanking and lowering transaction costs (Bayes, 2001; Gupta, 2005; Malhan & Rao, 2007; Tchouassi, 2012; Arayesh, 2015). Further, Kashem (2009) recognized that the cell phone, attaining the 5th position among all the 12 communication media employed by the rural farmers to seek agricultural information while ignoring the previously used traditional communication, electronic and interpersonal media.

Burke & Sewake (2008) maintain that the mobile internet provides significant volume of useful information related to agriculture and its associated problems. Online knowledge and information regarding banking has emerged as a successful initiative in promoting agri-business among farming communities. According to Shaibu & Powell (2008), cell phones can be used to provide information on agricultural markets to the farmers that in turn can enhance their bargaining power while marketing their agricultural commodities. The study, conducted in Ghana, revealed that farmers directly connected with the buyers through cell phones receive better prices for their agricultural goods as compared to using the brokers. Farmers with the cell phones can eliminate transport cost (Overa, 2006) while saving money, time and energy by avoiding going to the markets (Muto & Yamano 2009; Muto & Yamano., 2011; Lee & Bellemare, 2013). Cell phone-enabled technologies are also used to monitor and disseminate information about the out breaking of crop diseases (Ndyetabula & Legg, 2011; Kefala, 2011). Similarly, Murthy (2009) also maintains that SMS services used through cell phones can keep farmers updated on weather conditions and insects/pests in their fields.

A study conducted by the World Bank on the consumer behavior in the Philippines showed that the users of cell phone were realizing higher growth rates (11-17%) in their earned incomes (Labonne & Chase, 2009). Another study indicated the farmers having cell phones in Morocco were able to increase their average incomes by nearly 21% (Ilahiane, 2007). Adamides & Stylianou (2013) revealed that nearly 98% of the farmers in Cyprus were using cell phone as the medium to seek information on innovations in agriculture.

Despite these tremendous advancements, the grain yields are still questionable among the small landholders in many developing

countries due to lack of timely information, non-availability of inputs and skill gaps including improved farming technologies and management practices (Qiang et al., 2009). However, many such issues and constraints can be removed by proving the farmers with the appropriate technologies in the timely fashion by employing suitable extension tools and approaches like ICT – cell phones.

Though the traditional extension approaches and tools have been evaluated for their usefulness and impact on the farmers and farming in the Kingdom of Saudi Arabia yet the use of modern ICT technologies, particularly cell phones, have not been tried as an agricultural extension tool so far. Present study is an endeavor to explore how the farmers use their cell phones as a tool to have extension advices and gather information on the variables that facilitate or obstruct its use.

1.1 Research problem

In the technically advanced countries, the Agricultural Extension Services and farmers are using ICT – cell phones for providing information on various aspects of agriculture. However, the potential role, impact and extent of use of cell phones have not been studied in the Kingdom. The information gap prompted the researchers to identify how the farmers using cell phones seek agricultural information and explore the variables that facilitate or obstruct its mass scale application in the field.

1.2 Objectives of the study:

This study was conducted to identify the farmers using the cell phone technology as an extension tool for obtaining agricultural information. Second objective of the study was to explore the relationship between farmers' socio-economic characteristics and the use of cell phone technology as an extension tool. Further, study was also conducted to identify the variables obstructing or facilitating the use of cell phone technology as an extension instrument.

2 Materials and Methods

2.1 The methodology and the study area

Al-Delam, is an area located in center of Saudi Arabia which is 20 km away from the Governorate of Al-Kherj and 100 km from the capital Al-Riyadh, Saudi Arabia. It lies between longitude 47⁰ - 48⁰ E and latitude 23.5⁰ – 24.5⁰ N and 1360 feet high from sea level. Al-Delam has a population of 70,000 people with the total land area of 250,000 m². In the east side of the Al-Delam, a series of sand dunes known as Dhahbi and in the west side hills are present which is famous due to 'Jabal Abu Wald' and at north side 'Na'jan' surrounded by Wadi Turki having two branches known as; Wadi Al-Hssani and Wadi Al-Jarif that topography are also sandy.

2.2 Sampling procedure

A comprehensive study was conducted in Al-Ain, Al-Raweeb, Al-Sahna, Al-Adhar, Al-Mohammadi, Mawan, Al-Aqeemi, Na'jan and Rameeqa situated in Al-Delam. The total registered farmers in Al-Delam were 986 (Ministry of Agriculture, 2013). A simple random technique was used to select (277) respondents, about 28% of the total population. All respondents (277) were interviewed (face to face). About 81 respondents that account for 19.9% of the study population did refuse to respond and rest of the 196 (71.0%) respondents participated, furnishing the required information out of the 277 farmers.

2.3 Data collection and analysis

Data were collected against the properly designed questionnaire written in the very simple and straight Arabic language avoiding technical and scientific terms. Both descriptive as well as inferential statistical tools were employed to analyze. Descriptive statistics such as frequency counts, percentage and means were used to analyze and make the findings of the study more meaningful. Pearson-product correlation was used to identify the relationship between the farmer's socioeconomic characteristics and the cell phone technology used for seeking advice and services related to agriculture.

3 Results and Discussion:

In this section we discussed the results obtain from the field study that includes; socio-economic attributes of the respondents, information source regarding use of cell phone as an extension tools and the nature of relationship between farmers socio-economic characteristics and use of cell phone technology as an extension tools.

3.1 Socio-economic attributes of the respondents

Socio-economic characteristics of the respondents in table 1 showed that the farmers associated with agricultural activities with an age of 42 years or below account for 30.6% while the age group between 42-52 years accounts for 53.6 % of total population. Approximately 16% of the respondents are above 52 years old. Mean age of the respondents was 47.6 with the standard deviation of 10.7. This means that a vast majority of respondents belonged to middle age group and the youth were not participating in the agricultural activities in Al-Delam area.

Education is known as an investment in the human capital that increases labor productivity, reduces income inequality and certainly poverty (Amin & Awung, 2005). Alene & Manyong (2007) suggested that education had the positive effect on the adoption of new technologies and the innovations. Results of the present study revealed that some 39.8% of the respondents

associated with agriculture had a college level education followed by the 32.1% respondents with secondary level education whereas only 5.1% respondents out of total population had received their university education. It can be speculated that university graduates get better and well-paid jobs, earning more than they could make in agriculture. The study also revealed that majority of respondents participated in agriculture not as their first profession but opted as an additional source of income. Approximately 40% of the respondents considered agriculture as their primary source of income while 8.3% respondents were in the farming business to supplement their basic source of income. Only 1% stated they were farming for entertainment. The majority of the respondents (62.2%) owned farmlands and some 25% farmers were renting farms. Only 7.7% farmers were practicing agriculture in partnership. The majority of the respondents (53.1%) had farming experience ranging between 17 to 33 years. Approximately 31% of the respondents were with an experience of greater than 17 years. Only 15.8% of the respondents were in the farming business with greater than 33 years of experience. The average farming experience of respondents was 18.1 years with the standard deviation of 11.1.

Data in table-1 revealed that majority of the respondents (51.1%) had small land-holdings followed by 40.8% with the medium land holdings and 7.7% respondents (Mean 28.9 and SE 41.1) were with the landholdings more than 50 hectares. Concerning annual income, about 25.5% respondents earned SAR 200,000 - 300,000 per year from agriculture.

3.2 Distribution of respondent's attitude regarding cell phone use and source of information

The majority of the farmers (77%) in the present study were the permanent and regular users of the cell phones. Only 18.9% respondents have been found to be partial users, while 4.1% were not using mobile at all. Maximum numbers of farmers prefer to get agricultural information from the farmers in their neighborhood. Some 83.2% farmers were permanently depending on neighboring larger scale farmers whereas only 14.8% were dependent partially on the neighboring farmers. Approximately 71% of the farmers were permanently dependent on their friends and relatives and about 13.8% respondents were partially relying on their friends and relatives. Some 67.9% farmers were obtaining information from corporate marketing agents while only 21.4% partially used their services. Alnethmah Agriculture Fund and Agriculture Information Centers were used the least when obtaining information on agriculture. Only 2.6 % of the farmers utilized the services of both the sources. Farmers showed lack of interest in the other public institutions as well and relied more on the progressive farmers, close friends, and private companies for satisfying their needs for information related to agriculture (Table 2).

Table 1 Socio-economic characteristics of study area farmers

Age group							Total
	<42		42-52		>52		
Respondents	60		105		31	196	
Percentage	30.6		53.6		15.8	100	
Mean	47.6						
SE	10.7						
Education level							
	Illiterate	Primary	Middle	Secondary	College	University	
Respondents	13	12	20	63	78	10	196
Percentage	6.6	6.1	10.2	32.1	39.8	5.1	100
Source of income							
	First source of income		Additional source		Other sources (entertainment)		
Respondents	79		115		2		196
Percentage	40.3		58.3		1.0		100
Land ownership							
	Partnership		Rented		Own farm		Mixed
Respondents	15		49		122		10
Percentage	7.7		25		62.2		5.1
Farm experience (years)							
	Less than 17		17-33		Greater than 33		
Respondents	96		82		18		196
Percentage	30.6		53.6		15.8		100
Mean	18.1						
SE	11.1						
Farm size (ha)							
	Small holding (<20)		Medium (20-50)		Large (>50)		
Respondents	101		80		15		196
Percentage	51.1		40.8		7.7		100
Mean	28.9						
SE	41.5						
Annual income (SAR 1000)							
	< 100	100-200	200-300	300-400	More than 400		
Respondents	43	43	50	23	37		196
Percentage	21.9	21.9	25.5	11.7	18.9		100

Table 2 Distribution of respondent's attitude regarding cell phone use and source of information

Cell Phone Use					
	Respondents		Percentage		
Not using	8		4.1		
Partially using	37		18.9		
Permanently using	151		77.0		
Total	196		100		
Mean	2.73				
SE	0.53				
Subscription of Extension Services					
	Percentage		Mean	SE	
	Yes	No			
Do you have subscription from Agricultural Extension Service	23	77	1.22	0.42	
Would you subscribe in future	66.8	32.2	1.67	0.47	
Source of information for the farmers					
Source	Dependence (%)			Mean	SE
	Permanent	Sometime	No		
Farmers	83.2	14.8	2.0	2.81	0.44
Cooperate marketing agents	67.9	21.4	10.7	2.57	0.68
Friends and relatives	70.9	13.8	15.3	2.56	0.75
Agricultural companies and institutions	62.2	25.0	12.8	2.51	0.71
Agriculture company's agents	51.5	27.6	20.9	2.31	0.80
Agriculture Cooperative Associations	21.9	37.8	40.3	1.82	0.77
Ministry of Agriculture	10.7	52.6	36.7	1.74	0.64
Newspaper, magazines and bulletins	6.6	43.9	49.5	1.53	0.62
Alnethmah Agriculture Fund	2.6	47.4	50.0	1.53	0.55
Scientific information Websites	10.7	17.3	71.9	1.39	0.67
Government Board	3.1	31.1	65.8	1.37	0.55
Books and Scientific Journals	7.7	15.8	76.5	1.31	0.61
Agriculture Information Center	2.6	16.3	81.1	1.21	0.47
Departments of Agriculture at the universities	3.1	14.8	82.1	1.21	0.48

3.3 Correlation between farmer's socioeconomic characteristics and use of cell phone technology as an extension tools

The study shows a positive correlation (0.153*) between cell phone ownership and its usage as an extension tool for getting agricultural information through different modes like Calls, SMS, Whatsapp (Table 3). Researchers like Qiang et al., 2011; Aker, 2011, and Donner, 2009 showed that farmers who owned cell phones readily get information about inputs, crops health and marketing, and the availability of timely information certainly help improving livelihoods of the farmers. Although, it is an assumption that every single farmer knows the commodity price, due to high illiteracy and the involvement of the middlemen, it is not common in the developing countries.

Table 3 Correlation between uses of cell phone as an extension tool and farmer characteristics

Independent variable	Spearman correlation
Age	-0.136
Education level	0.126
Occupation	-0.137
Type of land ownership	0.043
Full time farm work	-0.065
Experience in agriculture	0.038
Total area of the farm	0.193**
Farm supervision	0.045
Types of labor	-0.150*
Annual income	0.069
Information source	0.116

*p=.05 **p=.01

Farmers know little about the market price in the urban areas of their own country. However, in such situations cell phones can help provide up-to-date information to both the producers and consumers and reduce the price gap. Results of the present study are in line with (Jensen, 2007) as he stated that cell phone use equalizes prices of the small gains in the whole of a particular region and ensures welfare of the consumers as well.

The study revealed a positive correlation (0.193**) between land ownership of the small-scale farmers and the use of the cell phones. Since the progressive farmers with large land areas use inputs wisely and also adopt innovative management practices to increase their farm incomes, it has been observed that the small farmers follow the advice of the progressive farmers to enhance their farm incomes as well. Small farmers might use cell phones

to make calls, send SMS or WhatsApp before visiting the progressive farmers in order to access agricultural information. The study revealed that the progressive farmers were carrying more credible agricultural information with higher financial resources to buy inputs whereas the small farmers were only using the cell phone to get agricultural information through Calls, SMS or WhatsApp.

The use of cell phone helps the farmers by providing them with the information on various features associated with agriculture like: weather forecast, and pests and diseases outbreaks. In addition, they use their cell phones to learn more about agricultural inputs such as seed, fertilizers, and pesticides (Preethi, 2009). This device has given new direction and approach to the farmers to communicate directly and share the recent advances with each other. The studies revealed that farmers were able to save energy and time due to the use of cell phones that ultimately increase their net incomes. Cell phones have enabled the farmers to communicate directly with the market brokers and customers for the sale of their produce on the acceptable prices (Chhachhar et al., 2014). The study revealed a negative correlation (-0.150*) between the use of cell phone and the type of labor as most of the laborers, hired on wages, did not have cell phones.

Conclusions and recommendations

The use of cell phone technology can act as an important change agent in many developing countries. This technology keeps the farmers up-to-date on essential information like weather forecast, agricultural practices, and marketing and prices of the commodities. This study showed that larger farmers realize more benefits due to ICT – cell phones by improving their farm productivity and for having better market information about the sale of farm commodities. The study revealed that the small farmers were using cell phones to gather information on production technologies and crop management practices from the larger farmers. Small farmers used cell phones to make calls, send SMS and WhatsApp. They were also frequently using cell phones to facilitate their visits to the larger farms and to consult with the larger farmers to seek their advice and collect information on the new farming practices and technologies.

Acknowledgement

The authors are extremely thankful to the King Saud University, Deanship of Scientific Research for extending all the possible assistance and support towards the completion of the research project.

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