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ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Factors Affecting Mobile Phone Usage by Farmers As A Source of Agricultural Information In Sharqia Governorate, Egypt

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Abstract

Mobile phones are one of the most important ICTs that contribute to farmers' adoption of agricultural innovations around the world, this study was conducted to identify the factors influencing mobile phone usage as a source of agricultural information for farmers in Sharqia Governorate, Egypt. A random sample of 355 respondents was interviewed during the period from January to April 2021. The results showed the diversity of sources that farmers depend on to obtain agricultural information such as fertilizer and supplies dealers, experienced farmers, relatives, and neighbors which were the main sources of agricultural information for respondents. Results indicated that only 9.9% of the respondents had a high mobile phone usage as a source of agricultural information, while 69.3% of them had a low degree of usage. A negative statistically significant relationship was found between the total degree of respondents' use of mobile phones as a source of agricultural information and their age at a 0.01 level of significance. while the relationship was positive with variables such as educational level, farm size, possession of a smartphone, and membership in social organizations. The mobile network's weak coverage in the village, lack of knowledge about agricultural applications, lack of knowledge about mobile phone operation, and the high cost of internet services were at the forefront of these problems facing the surveyed farmers who use mobile phones for agricultural purposes. Therefore, this study recommends the agricultural extension to make greater efforts to spread the use of ICT tools, including mobile phones technology among farmers.

Keywords: Agricultural extension, Extension methods, Mobile technologies, Information and communication technology (ICT), Agricultural innovations, Phone usage

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1. Introduction

Many rural communities in many countries, specifically in developing countries, are currently experiencing an unprecedented revolutionary trend in agricultural development due to the development and widespread adoption of ICT technologies based on contemporary mobile phones (Khidir, 2019). Modern information and communication technologies (ICTs), such as mobile phones connected to the Internet, have invaded many areas of life such as education, health, agriculture, commerce, etc. The world has witnessed the rapid development of mobile phone-based communications until it has become the most popular means of information and communication technology that we use in the current era. Statistics indicate that there are 4.68 billion users of this technology on this planet, representing 62.9% of the world's population. (STATISTA, 2019). The African continent has witnessed a civilizational shift and unprecedented growth in information and communication technology as a result of the huge investment in the infrastructure of this technology (World Bank Group, 2018). The rapid spread of mobile technology offers greater opportunities to overcome spatial barriers and reach distant and dispersed farmers and those who are not covered by agricultural extension services (Baumüller, 2017). Agriculture is no longer the same as it was in the past, techniques have changed, the information and needs of farmers have changed accordingly. In this changing context, no society can increase agricultural production using the same old techniques so the adoption of modern technologies by farmers is central to the agricultural development process (Asif et al., 2017). No developmental work in the agricultural sector can be accomplished without access to reliable, relevant, and timely information (Kaske et al., 2018). Information is an important factor of production factors, perhaps no less important than land, labor, and capital. Rapid exchange of reliable information in the agricultural sector is an essential factor in the farmer's adoption of new agricultural innovations, as a result of the lack of budget and inefficient infrastructure in developing countries, farmers do not have timely access to the latest agricultural knowledge (Baloch and Thapa, 2014). So, ICT tools such as ubiquitous mobile phones, in particular, are now an important economic resource for the dissemination of agricultural knowledge with the potential to reach many farmers across rural environments (Santosham and Lindsey, 2015). Hence, ICTs such as mobile phones can enable smallholders to easily access the production and marketing information they need in a smooth and timely manner. (Zhang et al., 2016, Chikuni and Kilima, 2019)

Studies show that mobile technologies save farmers energy and time, and ultimately improve their incomes (Mansingh & Erena, 2016). The use of ICT by farmers in marketing their products contributes to removing intermediaries, reducing costs and quickly reaching potential customers (Bachaspati, 2018). Farmers' access to the Internet via mobile phones may enable them to manage risks and support an appropriate response to climate change. (Baumüller, 2013) With the widespread availability of smartphones, many agricultural websites, pages, and apps have been created to meet the needs of farmers' renewable knowledge and it is undoubtedly an easier and better method compared to SMS texts. (Kaske, et al., 2018), which can be considered as one of the electronic agricultural extension tools that seek to provide an extension service in a modern way and tries to overcome the chronic problems of the existing agricultural extension systems. The national extension systems that rely on traditional methods to provide their advisory services suffer from a significant shortfall in the number of agricultural extension agents (Faostat & Production, 2016). As many extension workers are retired and due to poor budgets new extension workers are not hired, and the current percentage of extension workers is unable to meet the information needs of agricultural communities (Baloch and Thapa, 2014). In the Arab Republic of Egypt, for example, the number of agricultural extension agents decreased from 25,000 in 1990 to only 1,800 in 2021 (CAAES, 2021). Therefore, there is an urgent need to adopt new approaches to the dissemination of agricultural knowledge based on information and communication technology, provided that it is a complement and not a substitute for traditional agricultural extension, Mobile phones can play this role as the fastest tool for the dissemination of agricultural knowledge among farmers.

In this regard, the number of mobile Internet users in Egypt continued to rise to 36.51 million users, and the number of mobile phone subscribers increased from 22.9 million users in 2006 to 94 million in 2019, distributed among 4 service providers *(Figure 1)*(Capmas, 2020).

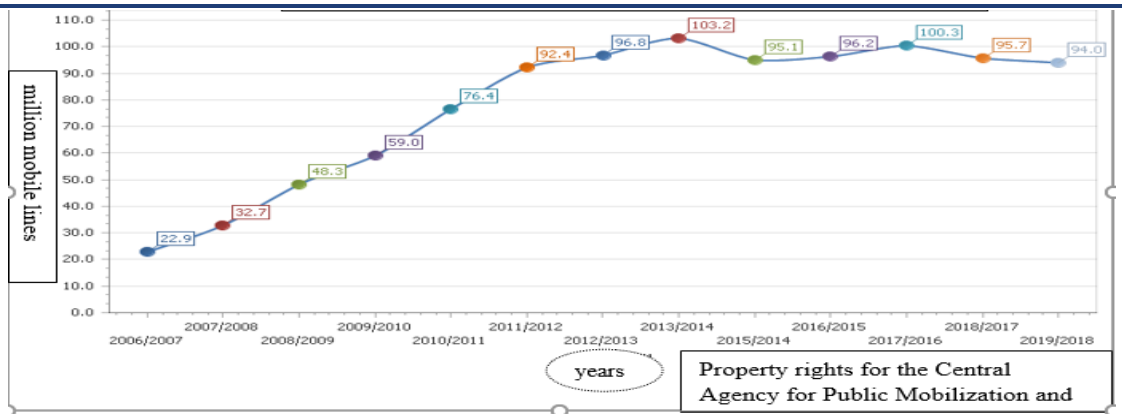

Figure 1. Number of mobile phone subscribers in Egypt 2006-2019
Source: Central Agency for Public Mobilization and Statistics (capmas.gov.eg)

Despite the availability of infrastructure and the huge number of subscribers, the Egyptian farmer, like other farmers in developing countries, still uses many different sources of information in his search for agricultural knowledge, but unfortunately most of these sources are old, less accurate and unreliable. Which creates knowledge gaps that the mobile phone can help to overcome (Miller et al., 2013). The main objective of this paper is to study the mobile phone usage degree among farmers in Sharkia Governorate, Egypt. As a source of agricultural information and the factors affecting it. The specific objectives of this study were to:

1- Examine the socio-economic characteristics of the respondents.
2- Identify Agricultural Information sources accessed by respondents using a mobile phone.
3- Identify the most important types of information's that farmers seek to obtain through the mobile phone
4- Identify the most important applications that respondents use to access information and news on agriculture
5- Identify the respondents' mobile phone usage degree as a source of agricultural information.
6- Identify the respondents' socioeconomic characteristics affecting their usage of the mobile phone as a source of agricultural information.
7- Identify the most important constraints facing the respondents regarding their usage of the mobile phone as a source of their agricultural information.

There are many variables that affect the degree of respondents' usage of the mobile phone as a source of agricultural information, Some of these variables were selected based on the results of previous studies. The conceptual framework of the study that shows the independent variables and the dependent variable is presented in the *Figure 2* below.

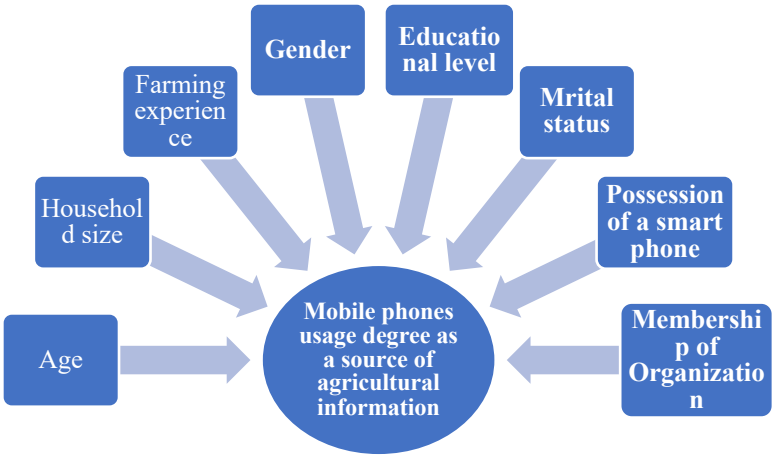

Figure 2. Study conceptual framework

Measurement of Variables;

The dependent variable (the overall degree of respondent's usage of the mobile phone in agricultural work):This variable was measured by asking the respondents about their mobile phone usage in agricultural work using a Likert scale consisting of 6 phrases that express the degree of respondents' usage of the mobile phone in agricultural work. Where the respondent chooses one of the following responses (always-sometimes-rarely-never) to the six scale statements. Numerical values (3-2-1-zero) were given in the case of positive statements and vice versa in the case of negative statements. The total scores obtained by the respondent reflect the respondent's usage degree of the mobile phone in agricultural work, whose theoretical range ranged between zero degrees to 18 degrees.

Independent Variables*:* The independent variables were represented in 8 variables: Age, gender, educational status, marital status, size of agricultural holdings, farm experience, possession of a smart phone, and membership in social organizations. The variables of age, agricultural holding size, and farm experience were measured by the total raw number in the data analysis, as for the variables of gender, possession of a smartphone, and membership in social organizations, the respondents were divided into two categories, male and female for gender, possessing or not possessing the variable of possession of a smart phone, and member or non-member for the variable of membership of social organizations. For educational level, the respondents were divided into 5 categories: illiterate, adult education, primary, secondary, and Tertiary education. As for marital status, the respondents were divided into 4 categories: single, married, divorced, widow.

2. Materials and Methods

2.1. Sutdy area

This study was conducted in Sharqia Governorate, as it is one of the largest governorates of the Republic in terms of agricultural area and population. It is the second Egyptian governorate after Beheira governorate in terms of agricultural area (880670 feedan), distributed among vegetables, fruits, and field crops, producing about 21% of agricultural production in Egypt. It has 682.325 holders, and the governorate is considered the third Egyptian governorate in terms of population after Cairo and Giza governorates, with a population of 8 million, and an area of 4.911 km^2 distributed among 13 administrative districts and two industrial cities (Directorate of Agriculture in Sharkia Governorate, 2020) *Figure 3*.

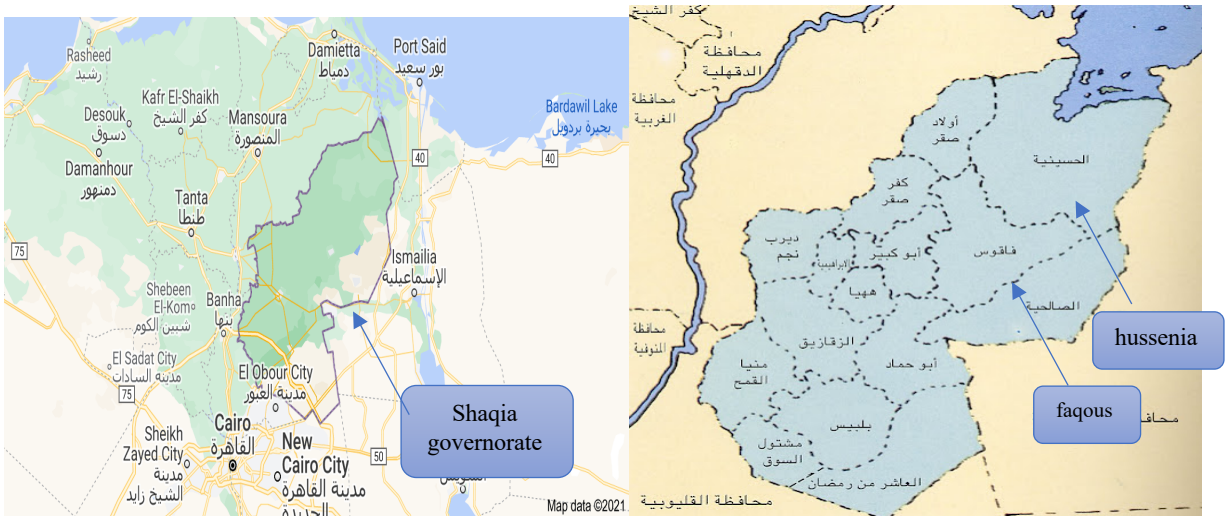

Figure 3: Map of Egyptian delta explained Al-Sharqiya governorate
http://www.sharkia.gov.eg/exploring_sharkia/default.aspx

2.2 Sampling and data collection

The two largest administrative centers (districts) were chosen in terms of cultivated area for 2020/2021, which are Al-Hussainiya districts 333926 feddans, Faqous 83.778 feddans as a geographic area (Al Sharqiya Governorate portal website, 2020). The largest village was chosen from each administrative center in terms of the number of farm holders. The selected villages were the Samakin Al Gharb village in Al-Hussainiya, with 1620 farm holders and the village of Didamon in Faqous, with 3010 farm holders.

Thus, the research population reached 4.630 farmers. To determine the sample size, Krejcie & Morgan equation was used (Krejcie and Morgan,1970) so that the study sample size was 355 respondents (Representing 7.7% of the total landholders in the two villages) they were relatively distributed to the two selected villages. On the basis of the relative weight of the number of holders in the selected villages, so that the number of holders was (124 respondents from Samakin al-Gharb and 231 respondents from Didamon village) were chosen randomly, as shown in *Table 1*.

Table 1. Distribution of the research sample in the selected villages

District	Selected villages	Number of holders in each village	Sample Representation Ratio	Sample size
Al-Hussainiya	Samakin al-Gharb	1620	34.9	124
Faqous	Didamon	3010	65.1	231
Totall		4630	100.00	355

Source: Sharkia Directorate of Agriculture, Agricultural Extension, unpublished data, 2020

Data were collected through a personal interview with the respondents during the period from January to April 2021, a questionnaire form was designed to serve the objectives of the research. A pretest was conducted on a sample of (30) respondents in the village of Ekyad in order to ensure the validity of the questionnaire and the extent of the respondents' understanding of it. The questionnaire included 6 sets of questions related to the characteristics profile of the farmers surveyed, Agricultural Information sources accessed by respondents using a mobile phone, agricultural purposes that respondents use mobile phones for, the applications that respondents use to obtain their agricultural information, mobile phone usage degree, and the most important problems facing the respondents regarding mobile phone usage as a source of agricultural information. Some statistical analysis tools were used, such as frequencies, percentages, mean score, and Pearson Product Moment correlation coefficient.

3. Results and Discussion

3.1 Characteristics profile of the farmers surveyed

The results *(Table2)* showed that only 20.6% of the respondents are less than 36 years old, which indicates that young people have left the agricultural profession. Where the results indicated that 44.2% of the respondents are elderly people over 50 years old, which is an age group that is mostly inactive and responds less to learning. Similar results were found by Das (2014); Mittal and Mehar, (2015) and Gbigbi, (2021). The results also indicated that the vast majority of respondents (89.8%) are men, as agricultural work in Egypt is mostly associated with men, despite the active participation of women in agricultural work. Similar results were found by William et al., (2021) in his study about the using mobile phone technology for increasing Banana productivity in Uganda, which stated that 67.7% of mobile phone users in agriculture were men, which reflects men's control over agricultural work despite the different environments and contexts. The level of education is one of the most important determinants of raising public awareness (Madenci, 2020) The results also indicated that 59.5% of the respondents had a high school diploma or more. However, the proportion of those who did not exceed the primary level of the respondents is still a large percentage (40.5%), which reflects a major problem facing the modernization of the agricultural sector. Where the world has overcome digital illiteracy, Egypt is still suffering from illiteracy at a time when farmers are required to use ICT tools to modernize their farms. The results also indicated that 77% of farmers were married and that divorce rates do not exceed 4% of the respondents, a result that may reflect family stability in the study area, which must be strengthened and built upon to serve the objectives of rural development. It is worth noting that Egypt suffers from the fragmentation of agricultural holdings, as these dwarf areas affect agricultural production as it is difficult to use modern agricultural technology tools. The results indicate that the majority of respondents (76.4%) have agricultural holdings of less than a feddan (feddan = 0.42 ha). These fragmented agricultural areas also affect incomes and access to ICT as confirmed by previous studies by Senthilkumar et al. (2013) and Ogutu et al. (2014), that farmers with large holdings have better access to modern technology.

Among the variables that this study focused on was the agricultural farming experience of the respondents, which is positively related to farmer's attiude to use information and communication technology such as mobile

phones to obtain agricultural information, as mentioned by Abebe and Mammo Cherinet (2018). The results indicated that 47.6% of the respondents have experience of more than 20 years in agricultural work, which is a long experience that is expected to be reflected in their agricultural performance and their use of ICTs. The results also indicated that 89.6% of the respondents have a smartphone, which reflects the spread of smartphones among farmers in Egypt, which is an opportunity that should be used by extension workers to deliver extension messages to farmers easily and in a short time, and they must also benefit from the involvement of the majority of respondents (75.3%) in social organizations in developing extension messages that support the formal and informal participation of farmers in such organizations.

Table 2 socio-economic characteristics of respondents (n=355)

socio-economic variables	Percentage	Mean	SD
Age (Years)			
Young (up to 35)	20.6		
Middle aged (36-50)	35.2	42.3	9.8
Old (above 50)	44.2		
Gender			
Male	89.8		
Female	10.2		
Educational level			
Illiterate	18.9		
Adult Eaducation	6.4		
Primary	15.2		
Secondary	35.8		
Tertiary	23.7		
Mrital status			
Single	12.7		
Married	77.2		
Divorce	3.7		
Widow	6.4		
Household size (feedan)			
<1 feddan	76.4		
1-1.99 fedddan	19.0	0.86	0.6
> 2 feddan	4.6		
Farming experience (Years)			
< 10	15.6		
10-20	36.8	18.9	8.77
> 20	47.6		
Possession of a smartphone			
Yes	89.6		
No	10.4		
Membership of social Organization			
Yes	75.3		
No	24.7		

Sources: Field Survey, 2021

3.2 Agricultural Information sources accessed by respondents using a mobile phone

Studies have indicated that farmers do not rely on one source to obtain their agricultural information, but rather rely on more than one source, which was confirmed by Alavion et al. (2016), Das (2014), and Mittal and Mehar (2015). Fertilizer and input supplies came at the forefront of the sources from which the respondents derive their agricultural information with 51.5%, followed by experienced farmers with 38.6% of the respondents, then relatives and neighbors 36.1%, while agricultural extension came in fourth place as indicated by 21.4% of the respondents *(Table 3).*

Similar results were reported by Khan et al. (2019) in their study about Pakistani farmers' access to agricultural information mobile phones, where private companies and traders of agricultural supplies ranked first (87.2%), while agricultural extension services came in the second rank with a percentage of 33.5% (Khan et al., 2019) which indicates to the decline in the role of agricultural extension compared to the role played by traders of fertilizers and agricultural supplies as an important source of information for agricultural respondents. Hence, the government must work hard to restore agricultural extension to its position as a reliable source of information for farmers.

Table 3. Distribution of the respondents according to their agricultural information sources (n = 355)

Sources of agricultural information	F	%	Rank Order
Seed and supplies dealers	183	51.5	1
Experienced farmers	137	38.6	2
Relatives and neighbors	127	36.1	3
agricultural extension workers	76	21.4	4
expert or consultant	18	5.1	5
Researchers	12	3.4	6
I don't call anyone	9	2.5	7

Sources: Field Survey, 2021 * Multiple response

3.3 Respondents' Use of Mobile Phones for Agricultural Purpose

The results presented in *Figure 4* indicated that the majority of the respondents do not use mobile phones as a source of their agricultural information However, there are some types of agricultural information that farmers use mobile phones to obtain, such as information related to pest control and disease management which ranked first with 42.8%, followed by the information related to agricultural recommendations on varieties, planting dates, irrigation, plowing, etc., that came in the second rank as mentioned by 37.5% of respondents, while information related to marketing and weather came in the last ranks, which is consistent with the study results obtained by Ramli et al. (2019) in Selangor Province, Malaysia on the rice farmers' search for agricultural information through the mobile phone In the forefront of this information, those related to pest control, while recommendations for weather and marketing information came in the last ranks. These findings also agreed with that mentioned by Alibu et al. (2016) where information on pest control ranked first, while weather information came in a lagging position. as well, as confirmed by Osadebamwen and Ideda (2015) in their study about mobile phones technology using by farmers in Nigeria, all these studies confirm that information on diseases and pests receives particular importance to farmers in more than one country due to the diversity of diseases and pests and the farmers' lack of knowledge of many of them, and because the losses caused by diseases and pests are great, so it cannot be ignored, so the farmers seek to search for information that facilitates them to get out of the crisis. Thus the agricultural extension should give this information a priority when planning new extension programs.

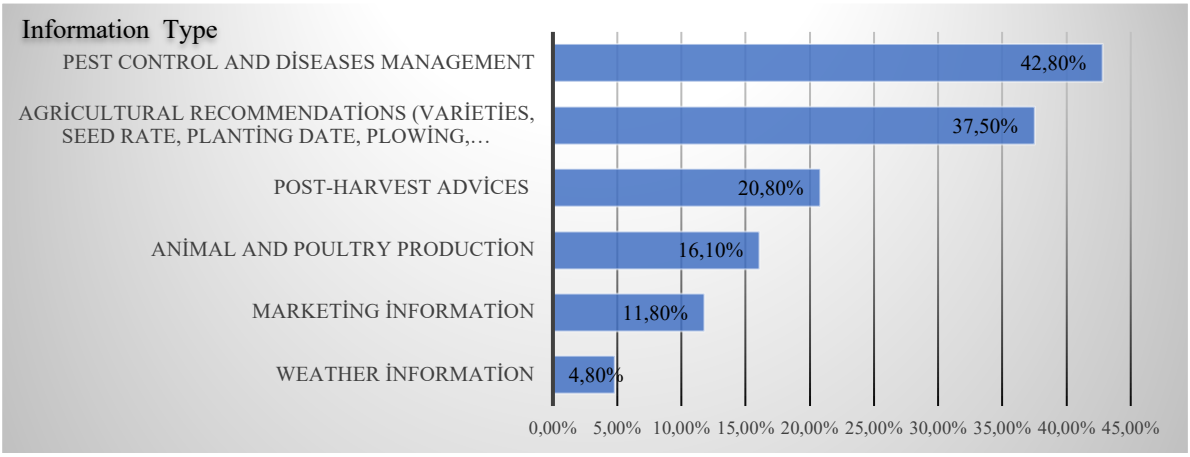

Figure 4. Using mobile phones as a source of agricultural information n=355
Sources: Field Survey, 2021 * Multiple response

3.4 Applications that respondents use to obtain their agricultural information

The results presented in *Figure 5* indicated that there are many applications that the respondents use to access agricultural information. Regardless of the phone calls, most of these applications are of limited use. The majority of farmers do not use these applications for many reasons, including illiteracy and not having smartphones.

Moreover, most of these applications depend on the Internet, in light of the presence of a large percentage of farmers who are not proficient in dealing with ICT tools or cannot afford the cost of operating most of these tools. The respondents' use of voice calls came first with a rate of 50.3%, perhaps because it is the easiest and fastest in light of many limitations and problems facing other methods, followed by Facebook with 39.9%, WhatsApp 35.5%, browsing the Internet 20.4%, SMS and e-mail came in the late rank with 6.9% and 4.8%, respectively. This is consistent with what was mentioned by Anselme et al (2012) in their study about the determinants of rice farmers' usage of information and communication technology in Benin, where they indicated that only 10% of the rice farmers in Benin use SMS and only 3.2% of the respondents use e-mail applications, and this result does not differ from what was mentioned by Jaji et al. (2017) in their study on mobile phone utility by women farmers in Lagos State, Nigeria, they found that 15.2% of the respondents used SMS to access market information. From the above, it is clear the weak use of mobile phones among farmers, hence the need to spread information and communication technology tools such as mobile phones among farmers in light of the sharp erosion in the number of extension workers in Egypt.

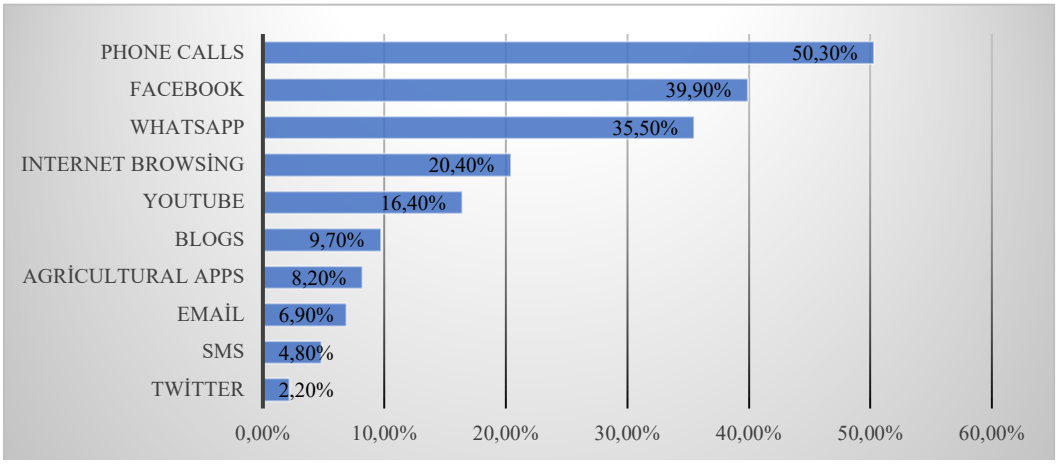

Figure ***5. Using a smart phone, how do you access agricultural information***
Sources: Field Survey, 2021 * Multiple response N=355

3.5 Mobile phone usage degree as a source of agricultural information

It is known that mobile phones are one of the most important ICTs that contribute to the adoption of agricultural innovations by farmers around the world by providing easy paths to access agricultural information. Results in *Table 4* indicated that only 9.9% of the respondents had a high mobile phone usage as a source of agricultural information, while the vast majority of respondents (69.3%) had a low degree of usage, This may be due to old age of the respondents and the dwarfing of the tenure owned by them, which in turn leads to a decrease in income and a decrease in the use of information and communication technology. Illiteracy and the presence of a large percentage of respondents only who can read and write are among the reasons for the low degree of use of mobile phones by farmers.

Table 4. Distribution of respondents according to their overall use of mobile phone as a source of agricultural information (n = 355)

Characteristics	Farmer's categories	F	%	Mean	SD.
Use of mobile phone	Low usage (up to 6)	246	69.3	6.37	4.02
	Moderate usage (7-12)	74	20.8		
	High usage (above 12)	35	9.9		

Sources: Field Survey, 2021

These results are in line with what Asif et al. (2017) mentioned in their study on the factors affecting the use of mobile phones by farmers in receiving information about vegetable cultivation in Bangladesh where they emphasized that the use of mobile phones by farmers to obtain marketing information was low, as 70% of the respondents fall into the low-use category of mobile phones and 30% in the medium-use category, and

there is no one in the high-use category. These results necessitate the agricultural extension to make greater efforts to spread the use of ICT tools, including mobile phones technology among farmers.

3.6 Relationship between the Respondents Selected Characteristics and Mobile phone usage degree as a source of agricultural information

Previous studies confirm the influence of personal characteristics on the use of ICT tools among farmers (Aldosari et al., 2019) One of the most important factors is the respondents' age, which is a pivotal characteristic that has an important role in the respondents' behavior and decisions (Khan et al., 2019). Whereas, farmers' adoption of ICTs is highly correlated with age (Sikundla et al., 2018). The results *(Table 5)* showed a negative, statistically significant relationship between the total degree of respondents' usage of mobile phones as a source of agricultural information and their age at a level of significance of 0.01. This result is consistent with what was mentioned by Islam and Grönlund (2012); they report that young and middle-aged people use mobile phones more than the elderly, and this may be because the elderly tend to the traditional pattern of agriculture, which many of them do not want to change and perhaps the belief of many of them that their agricultural experience is great It makes them not bother to look for new technologies and they don't use ICTs tools like mobile phone to search for agricultural information. This fact is confirmed by Roy et al. (2018) in India, they found that older farmers were more attached to traditional beliefs and did not rely on new ICTs. Similar results are supported by Asif et al. (2017). In Bangladesh, Xiaolan and Shaheen (2012) in India, and Aldosari et al. (2019) in Saudi Arabia, where these studies showed a negative relationship between the age of respondents and the extent of their use of mobile phones and attributed this to increased responsibilities with age and the difficulty of spending on information technology technologies such as mobile phone. Concerning the farm size, Studies indicated that farmers with larger farms are more able to adopt modern technologies because they have a greater ability to bear the costs of this technology, unlike small farmers. (Khanna et al., 2012), In contrast to small farmers, farmers' use of ICTs tools increases with the increase in agricultural holdings. Mittal and Mehar, (2015) mentioned that Indian farmers who own larger areas of agricultural land have more potential to benefit from ICTs, unlike small farmers, which was confirmed by the current study, where there was a significant relationship at the 1% level between the farm size and the respondents' use of the mobile phone. Concerning farming experience, results *(Table 5)* indicated that there was no relationship between respondents' agricultural experience and their use of information and communication technology. This contradicts the findings of Abdul -Aziz, et al. (2015) which confirmed the existence of a positive relationship between respondents' agricultural experience and the level of their use of the mobile phone as a source of agricultural information, this can be explained by the association of experience mostly with the age of the respondent, for which many studies have shown a negative relationship between it and the use of information and communication technology.

Table 5. Correlation Coefficient Values Between using mobile phone degree and Studied independent Variables

Independent variables	The values of correlation coefficient	P-value
Age	0.457 - **	0.00
Household size	0.343 **	0.00
Farming experience (Years)	0.059	0.631

* Significant at 0.05 ** significant at 0.01

Previous studies (Kwapong, 2009; Nyamba, 2017) indicated that men and women do not show differences in terms of ICT usage, this is in agreement with the results presented in *Table 6*, which indicate that there is no correlation relationship between the gender of the respondent and the total degree of using the mobile phone as a source of agricultural information. This may be due to the existence of equal opportunities for male and female respondents to access information and communication technology tools. Regarding education level: The educational level is closely related to the farmers' use of information and communication technology, as higher educational levels affect the individual's ability to use modern technology (Piccoli et al., 2001). Certainly, the higher level of farmers education, the greater their ability to understand and use ICTs tools, which has been confirmed by studies of (Abebe et al., 2018; Alavion et al., 2016; Mittal and Mehar, 2015). The results *(Table 6)*

indicated a positive correlation between the respondent's educational level and their use of the mobile phone to obtain agricultural information, which comes in parallel with the study of Obong et al. (2018), which confirmed that respondents with higher educational levels have greater agricultural knowledge and often use mobile phones in obtaining agricultural information. The results presented in Table No. 6 indicated that there is no relationship between respondents' marital status and their total degree of mobile phone usage to obtain agricultural information. This may be due to the lack of significant variation in this variable, as the vast majority of respondents are married, and the researcher did not find any study that proves or denies the existence of such a relationship. Concerning Possession of a smartphone: The results in *Table 6* indicated that there is a positive relationship between respondents' possession of a smartphone and their total degree of using the mobile phone as a source of agricultural information, and this is normal, as analog phones have become obsolete and do not enable farmers to make optimal use of ICT tools. Membership of social organizations: The membership of social organizations makes people more open and more willing to search for new. The results in *Table 6* indicate that there is a positive relationship between respondents' level of membership in social organizations and the overall degree of mobile phone use as a source of agricultural information. These results come in line with studies of (Ogutu et al., 2014; Mittal and Mehar, 2015; Alavion et al., 2016)

Table 6. Chi-Square values of the Nominal studied variables and the respondents job satisfaction level

Independent variables	The values of Chi-Square coefficient	Df	P-value
Gender	6.246	2	0.613
Educational level	9.556 **	8	0.025
Mrital status	8.011	6	0.531
Possession of a smartphone	6.880 **	2	0.00
Membership of social Organization	7.390 *	2	0.02

Source: Field data 2018. χ 2= Chi-square; df=degree of freedom * Significant at 0.05 ** significant at 0.01

3.7 The most important problems facing the respondents regarding mobile phone using as a source of agricultural information:

Results in *Table 7*. indicated that there are many problems facing the farmers surveyed regarding their using mobile phones for agricultural purposes.

Table 7. Constraints of using mobile phones as a source of agricultural information by the respondents (n = 355)

Constraints	Number of respondents indicating constraints			WMS	Rank Order
	High	Moderate	Low		
Weak Mobile network coverage in the village	157	164	34	2.34	1
Lack of knowledge regarding agricultural applications	216	30	109	2.30	2
Lack of proper knowledge regarding mobile operation	150	97	108	2.11	3
Illiteracy	130	127	98	2.09	4
High charges on internet services	112	99	144	1.90	5
High cost of using smart phones	98	114	143	1.87	6
Lack of adequate training about internet browsing	77	63	215	1.61	7
The agricultural extension agents phone numbers are not available	55	98	202	1.58	8
Agricultural mobile apps in English	33	74	248	1.39	9

Sources: Field Survey, 2021 WMS – Weighted Mean Score

The forefront of these problems was the weak mobile network coverage in the village, the lack of knowledge about agricultural applications, the lack of knowledge about mobile phone operation, in addition to the problem of illiteracy The high cost of Internet services, the high cost of owning a mobile phone, the lack of training on how to browse the internet, and the presence of some applications in English. This was confirmed by several studies. It

is natural that the order of these problems varies according to the environment and the context of each study. While Salau et al. (2017) saw that the poor coverage of the internet and the high cost of access to the internet were the first of these obstacles, as they were the last obstacles in order according to Khan et al. (2019) Other studies such as Abebe and Mammo (2018). About the use of information and communication technology for grain farmers in Ethiopia confirmed that the most important of these problems was the weak mobile network, poor knowledge about using mobile applications, and the high cost of mobile use, while Huda et al. (2017) indicated that the poor training on how to browse the Internet and the weak knowledge of how to operate the phone, which were the most important of these obstacles, other studies pointed to the risk of digital illiteracy as a barrier to mobile phone usage (Saroj et al., 2017), while Hoang, (2020) found that the lack of mobile phone knowledge, language barriers, and poor network coverage were the most important of these obstacles.

As we mentioned earlier, these problems are considered similar, although their arrangement and importance differ according to the study environment. So National agricultural extension systems must strive to develop solutions to make ICT tools accessible to simple farmers everywhere.

4. Conclusions

Access to agricultural information through mobile phones is easier and faster than traditional agricultural extension methods, however, it cannot be considered a substitute for the majority of rural farmers in light of the presence of many limitations such as illiteracy, mobile network's weak coverage in the village, lack of knowledge about agricultural applications, lack of knowledge about mobile phone operation, and the high cost of Internet services. The majority of respondents do not use mobile phones app for many reasons, including illiteracy and not having smartphones. Moreover, most of these applications depend on the Internet, in light of the presence of a large percentage of farmers who are not proficient in dealing with ICT tools or cannot afford the cost of operating most of these tools. It was clear the significant decline in the role of agricultural extension compared to Fertilizer and supplies dealers, experienced farmers, relatives, and neighbors which were the main sources of agricultural information for respondents.

It was clear the low use of mobile phones among farmers, however, young respondents, those with large holdings, those with higher educational qualifications, as well as those who are members of social organizations were the most likely to use mobile phones as a source of agricultural information. Hence, the need to spread information and communication technology tools such as mobile phones among farmers in light of the sharp erosion in the number of extension workers. These results necessitate the agricultural extension to make greater efforts to spread the use of ICT tools, including mobile phones technology among Egyptian farmers.

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