

Study of the Importance and Application of Information and Communication Technology by Agricultural Experts in Iran

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Abstract: Information and communication technology (ICT) in agricultural sector is an emerging field focusing on the enhancement of agricultural and rural development in many countries. This is a fact that access on information is the main factor to development. During last decade we could see that information and communication technology were affected all spheres of our life. The Main purpose of this study was study of importance and usage of ICT in agricultural system of Iran. The population of this study consisted of Personnel that working in the ministry of agriculture in Iran (N=1250). Questionnaire reliability was estimated by calculating Cronbach's alpha. Cronbach's Alpha coefficient was 0.87. The Importance of ICT from view point of respondent's was in a good level. And application of ICT by respondents was in average level. Also results show that 75% of respondents have PC in home. 67% of respondent's accesses to the internet and 83.3% of them have an Email. 82% of respondent's have access to Internet 5 hour per week. By using multivariate regression analysis independent variables could explain 59% of variance in importance of ICT by respondents and 68% of application of ICT by respondents.

Key words: ICT • Application • Importance • Agricultural Experts • Agricultural Systems • Iran

INTRODUCTION

Information and communication technology (ICT) in agriculture is an emerging field focusing on the enhancement of agricultural and rural development in many countries. This is a fact that access on information is the main factor for development [1]. During last decade we could saw that progress in information and communication technology (ICT) was affected all spheres of our life. Due to progress in technologies, we could able to procure high-speed reliable computers with huge storage capacities at affordable cost. Also, database can be used to store and retrieve large amount of information that can be coupled with Internet technology to deliver information for our needs [2]. Recent information technology developments enable the maintenance of huge information (text, image, sound and video) stored with negligible down-time. The stored information can be quickly extracted by millions of users [3]. We hear a great deal about the information technology in everywhere. It seems our world seemingly turns [4]. The Information Technology has worked its way into many different aspects of everyday life, like agricultural sector [5]. The web allows information to be

shared across the world. Web sites give farmers the power to access and post information on anything related to agriculture, including crops, animal husbandry, buying and selling equipment and livestock and different methods of farming. The Internet has modified the distribution of information [6]. As an emerging human occupation, Internet usage warrants further study and investigation. The wide scale and diversity of agriculture provides the ultimate challenge to the potential on information technology [7]. Information technology offers the ability to increase the amount of information provided to all participants in the agricultural sector and to decrease the cost of disseminating the information [1].

Agriculture sector have advances experiences in technology. Recently, the use of information technologies, such as e-mail and the World Wide Web, has become commonplace [8]. In any sector information is the key for its development and agriculture is not exception of it. ICT helps to take timely action, prepare strategies for next season or year, prepare to the market changes and avoid unfavorable challenges. So the development of agriculture may depend on how fast and relevant information is provided to the farmers [9]. The Internet was increasing communication and business

opportunities within the agricultural community. Farmers, agricultural researchers, cooperatives, suppliers and buyers use the Internet to exchange ideas and information, as well as to conduct business with each other [3]. Information technology can play a major role in facilitating the process of transformation of people to meet these challenges and to remove the fast growing digital divide [10]. At the firm level, information promotes the efficiency and effectiveness of production and customer service. Information may also increase the level of trust consumers have in a product to increased demand. Information technologies offer the ability to increase the amount of information provided to all participants in the agricultural sector and to decrease the cost of disseminating the information [8].

Information and communication technology were playing important and vital role in agricultural production and marketing. In the existing competition, there is need to rapidly attract new customers as well as retain existing customers [2]. The progress in information technology was affecting all spheres of our life. For Iran, this progress in Information Technology provides new opportunities to improve the utilization and performance of agriculture system such as farm level, farm management, deliver new methods for cultivation, exchange information between farmers, researchers and extension educator and suppliers. Then we must improve farmer's ability to use information technology through various education programs responsive to the information age of the 21st century.

In most studies, findings indicated that exited positive attitudes of the users associated with the use of ICT and their results indicated that users were used ICT in their activities [11-18]. Heysung studies [19] in regarding factors that affecting the adoption on ICT between educators showed that uses these technologies have positive effect on their educational performance.

Karimi, *et al.* [12] stated that in using ICT by agricultural educators considering to some factors such as having information literacy skills, the purpose of internet use and english proficiency were necessary.

Awareness of the application of ICT by agricultural expert's necessary for program planners in order to developing effective policies in the field of ICT in agricultural sector.

Considering to the issue the main goal of this study was evaluate the amount of respondents view points about ICT and study status using of ICT by agricultural experts in the Ministry of Agricultural. Also specific objectives of this research were:

- Study the personal characteristics of respondents.
- Study a respondents view points about importance of ICT and usage the level of ICT by agricultural experts in the Ministry of Agriculture in Iran.
- And investigate problems in the development process for ICT for researchers and agricultural experts in the Ministry of Agriculture in Iran.

MATERIALS AND METHODS

The methodology used in this research involved a combination of descriptive and quantitative research and included the use of correlation and descriptive analysis as data processing methods. The Main purpose of study was study of importance and usage of ICT in agricultural system in Iran. The population of this study consisted of personnel that working in the ministry of agriculture in Iran (N=1250). The ministry of agriculture in Iran was the target population for the study. Population have been selected by using stratified randomization method (n=201). Cronbach's Alpha coefficient was 0.87 which demonstrated that the questionnaire was highly reliable. In this research we study the importance of ICT from viewpoint of respondent's and the rate of ICT usage by respondents.

The questionnaire was the instrument to collect data. The instrument was divided to three sections. The section one focused on respondent's viewpoints regarding the amount of ICT importance (7 items). Section two was designed to gather data about respondent's methods use regarding the amount of ICT (10 items). In two section five-point Likert-type scale was used to quantify responses for two and three sections which ranged from: 1=very low, 2=low, 3=medium, 4=high and 5=very high. Section three was designed to gather data about respondent's characteristics such as sexuality, age, education level, experience in employee, have Personal computer in home or in office work, access to internet, have email box, hour access to internet or computer per week.

Content and face validity were established by a panel of experts consisting of faculty members in information technology and extension and education specialist in University and agricultural officers of Tehran Township. The data were coded and analyzed by using the Statistical Package for the Social Science (SPSS16) for windows. Descriptive statistics (frequencies, means, standard deviations, range, minimum and maximum) were used to describe analyzed data. Correlation and Stepwise Regression were employed to analyze the relationships between dependents and independents variables.

RESULTS

Respondent's employees in Agriculture Ministry in Iran were the statistical population of this study. The average age of respondent's was 38 years old, that the majority of them (53.7%) ranged from 31 to 41 years old (Table 1). Education level of them was in PhDs degree, Master of Science degree and Bachelor of Science Degree. The average level of age experience were 14 years old and the majority of them (24.88%) ranged in employees experience from 11 to 16 years old. 72% of respondents have PC and amount of 66.6 % have access to PC in offices. Table 1 show other characterizes of respondents. Also majority problems in usage of ICT by respondents were:

- Don't have sufficient and suitable education for learning ICT.
- Don't have time to use computer and internet in environmental organization.
- Lack attention of department ICT tools and developed usage of it's between employees.
- And high cost to sale PC and internet.

Respondent's view point about importance of ICT and application of ICT by them was determined as described in the methodology section. For the purpose of characterization, the scores were labeled as: "weak", "mediate", "good" and "excellent". Based on means and standard deviations of the view point score, the four categories were determined by scores that fell within two standard deviations to the left of the mean on a normal curve and two standard deviations to the right of the mean [9].

- A = Weak: $A < \text{Mean} - \text{SD}$.
- B = Mediate: $\text{Mean} - \text{SD} < B < \text{Mean}$.
- C = Good: $\text{Mean} < C < \text{Mean} + \text{SD}$.
- D = Excellent: $\text{Mean} + \text{SD} < D$.

The level perception of respondents about ICT was showed in Table 2. Results showed that respondent's view points about ICT were 15.8% in weak level, 25.3% in mediate level, 38.2% in good level and 20.7% in excellent level. Finding indicated that respondents have good perception about ICT and this is good news for program planners to develop ICT devices and program based IT in agricultural sector in staff level in Ministry of Agriculture in Iran. Respondent's level of application of ICT in Table 2 indicates that a majority of respondents had good level (n=63 & f=31.3%) application ICT in their works.

Table 1: Respondents' personality characteristics

Variables	Items	F	%	Mean	Sd
Age	20-30	25	12.43	38.26	7.08
	31-40	108	53.70		
	41-50	59	29.35		
	Upper than 51	9	4.52		
Sex	Male	145	72.10		
	Female	56	27.90		
Age of service experience	Lower than 5	30	15.00	13.78	7.24
	5-10	45	22.38		
	11-16	50	24.88		
	17-25	62	30.84		
	Upper than 25	14	6.90		
Have PC	Yes	151	75.00		
	No	50	25.00		
Years access to internet	Lower than 5	50	25.00	7.30	4.60
	5-10	108	54.00		
	Upper than 10	42	21.00		
Access to computer in office	Yes	134	66.60		
	No	67	33.40		
Access to internet in office	Yes	133	67.17		
	No	65	32.83		
Have Email	Yes	165	82.00		
	No	36	28.00		
Average use of computer per week (hour)	Lower than 5	58	30.00	15.20	13.30
	5-10	47	23.97		
	11-20	46	23.47		
	21-30	21	10.71		
	Upper than 30	24	11.85		
Average use of Internet per week (hour)	Lower than 2	25	12.50	6.50	8.60
	5-2	126	63.00		
	6-10	30	15.00		
	Upper than 10	19	9.50		
Have problem in use internet	Yes	60	29.80		
	No	141	70.10		

Table 2: respondents view point about ICT

Variables	Items	F	%
Importance of ICT	Weak	32	15.8
	Mediate	51	25.3
	Good	77	38.2
	Excellent	42	20.7
Application of ICT	Weak	39	19.4
	Mediate	56	27.9
	Good	63	31.3
	Excellent	43	21.4

Table 3: Correlations between variables and Importance of ICT

Variables	r _s	Sig.
Age	0.023	0.663
Education level	0.548**	0.000
Age of service	0.026	0.326
Age of access to internet	0.089	0.098
Average hour of usage computer per week	0.326**	0.000
Average hour of usage Internet per week	0.418**	0.000

** = P<0.001

Table 4: Correlations between variables and usage of ICT

Variables	r _s	Sig.
Age	-0.316*	0.000
Education level	0.448**	0.000
Age of service	0.026	0.053
Age of access to internet	0.389**	0.000
Hour of usage Computer per week	0.443**	0.000
Hour of usage Internet per week	0.402**	0.000

* = P<0.05 ** = P<0.001

Table 5: Variables coefficient in regression analysis

Independent Variables	EXP(B)	SE	t	P-value	Beta
Constant	2.327	0.451	5.158	0.001	---
Level of education (X ₁)	0.725	0.225	3.222	0.001	0.572
Age of usage Internet (X ₂)	0.717	0.128	6.066	0.001	0.544
Hour of use computer per week (X ₃)	0.507	0.118	4.26	0.002	0.388

R=0.781 R²= 0.60 R²_{adj}= 0.571 F=136.44 Sig: 0.000

Table 6: Variables coefficient in regression analysis

Independent Variables	EXP(B)	SE	t	P-value	Beta
Constant	5.137	0.494	10.700	0.001	---
Age (X ₁)	-0.234	0.125	1.870	0.004	0.103
education Level X ₂)	0.436	0.168	2.550	0.001	0.231
Age of usage Internet (X ₃)	0.627	0.301	2.760	0.001	0.320
Hour of use internet per week (X ₄)	0.415	0.144	2.880	0.001	0.257
Hour of use computer per week (X ₅)	0.798	0.191	4.170	0.001	0.575

R=0.86 R²= 0.734 R²_{adj}= 0.681 F2=237.28 Sig: 0.000

Bivariate correlation indicated in the Table 3 that positive and statistically significant correlations were found between the educational level of respondents, average hour usage of internet and computer per week with dependent variable “Importance of ICT from view point of respondents” (Table 3).

Results indicated that positive and statistically significant relationship found between the respondents’ education level, age of access to internet and average hour usage of internet and computer per week with dependent variables “Application ICT” by respondents. Also finding indicated that negative and statistically significant relationship found between the respondents’ age with dependent variable “application ICT” by respondents (Table 4).

For predicating probability importance of ICT by agricultural experts, the logical of f(x) function was calculated that could be inferred to the population of this study (Table 5). Based on statistically significant variables in the regression analysis and constant values, the regression equation could be derived as follows for importance of ICT. The final multivariate regression model by B and β coefficients was:

$$y = 2.327 + 0.725x_1 + 0.717x_2 + 0.507x_3$$

$$y = 0.572x_1 + 0.544x_2 + 0.388x_3$$

The multivariate regression analysis indicated that R²_{adj}= 0.571 therefore about 57% of variance in importance of ICT could be explained by level of education, age of usage Internet and average hour use computer per week by respondents (Table 5).

For predicating probability application of ICT by agricultural experts, the logical of f(x) function was calculated that could be inferred to the population of this study (Table 6). Based on statistically significant variables in the regression analysis and constant values, the regression equation could be derived as follows for application of ICT. The final multivariate regression model by B and β coefficients was:

$$y = 5.137 - 0.234x_1 + 0.436x_2 + 0.627x_3 + 0.415x_4 + 0.798x_5$$

$$y = 0.103x_1 + 0.231x_2 + 0.320x_3 + 0.257x_4 + 0.575x_5$$

The multivariate regression analysis indicated that R²_{adj}= 0.681 therefore about 68% of variance in application of ICT could be explained by age of respondents, level of education, age of usage Internet, Average hour use internet and computer per week by respondents (Table 6).

DISCUSSION

The advancements in ICT can be utilized for providing truthful, timely, important information and services to the agricultural experts. ICT have a potential to contribute to achieving significant economic, social and environmental benefits. The purpose of the research was to study the perception and usage of agricultural experts regarding use of ICT in agricultural Ministry of Iran.

Technologies have become very important in human life at the 21 century. These technologies can be considered as a main factor to development of fields [20].

Based on findings of this study, the following conclusions were drawn and recommendations. The importance and application of ICT by respondents were in a good level. Also results show that 75% of respondents have PC in home and usage its. 67% of respondent’s access to the Internet in their office place and 82% of respondents has an Email box. These results were showed that a high capacity existed for enhancing and investment in ICT between agricultural experts in Ministry of Agriculture in Iran. Karani *et al.* [21] in their study showed that access to information by ICT among agricultural students was in high level and they have good competence in this filed. Also Pouratashi and Mokhtarnia [20] pointed that Agricultural Faculty members have positive opinion toward Internet use.

Bivariate correlation indicated that positive and statistically significant relationship found between the Importance of ICT from view point of respondents and Application of ICT and independents variables.

Therefore for enhancing the rate of usage ICT in agricultural sector policy makers must be attention to providing equipments for agricultural experts. This finding is also pointed by several authors [11-18]. Therefore establish and providing infrastructure to enhance usage ICT among users was necessary.

Heysung studies [19] in regarding factors that affecting the adoption on ICT between educators showed that uses these technologies have positive effect on their educational performance. Also Karani *et al.* [21] pointed that by using ICT and access to internet agricultural student could find new information about agricultural jobs. Also Lashgarara, *et al.* [22] showed that, according to the experts' point of view, the situation of food security in rural Iranian households was unfavorable, but that ICTs could play an important role in improving the situation. But use of ICT has many barriers and obstacles to user. Omidi-Najafabadi *et al.* [23] classified the challenges and requirements of ICT into six and four latent variables: organizational, social, human, legal, financial and technical challenges and instructional, organizational, technical, cultural requirements. The multivariate regression analysis indicated that about 68% of variance in application of ICT by respondents could be explained by age of respondents, level of education, age of usage Internet, average hour use internet and computer per week by respondents. Therefore managers had pointed to provide equipments to their employers for access to computer and internet. Recommendations and strategy that emerged from the discussions were focused on: Policy priorities emphasizing that in extending application of ICT among agricultural experts. Imperative investments in human capital, training and provide workshops to agricultural experts. Also for promoting application and adoption of ICT in agricultural sectors pointed to these notices is necessary: establish communication between farmers, extension agents, agricultural experts, research centers and community by information technology. The interaction between all components must be mutual. Internet used as a facility to transfer the advanced agricultural information to the farming community. This finding also points by Ommani (2010). Lack of equipment and don't have sufficient education were the major problem is application of ICT by agricultural experts. This finding is also pointed by Karimi *et al.* [12]. Ahmadpour *et al.* [24] study the factors that affecting on development of e-learning in agricultural extension in Iran. The components were classified into financial, policy, support, technical, evaluation, educational,

cultural, personal, psychological, managerial and organizational factors. Also results shows that these factors affecting the development of e-learning in Iran's agricultural extension are psychological, organizational, cultural, technical, financial and managerial factors that should be considered. And there are no adequate equipments in extension centers. Also Ahmadpour and their co-workers [24] recommended that extension organization should pay more attention to provide appropriate hardware and software and infrastructure, to be successful in e-learning projects. Thus, there is a need to understand as to how far the ICT initiatives are able to address the agricultural experts need so that better solutions can be developed to address those increase usage ICT in their work field.

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