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Empowerment of farmer villagers using electronic knowledge management model

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Abstract
To empower the farmer villagers, execution of training programs including semi-presence training, open training and virtual training is essential. The main purpose of the present research is to determine the factors affecting the enabler trainings to farmer villagers with an emphasis on the component of culture and education technology using the interpretative structural modeling together with structural equation modeling. The combined method has been used as the research method. At the first stage, the main indices were extracted by data collection via Delphi method from the knowledge transfer and management and their validity were determined, and at the qualitative stage the questionnaire was given to the participants after determining the reliability. The statistical population consists of 1930 individuals including faculty members, promoters, educational instructors and those employed in agriculture research centers and institutes. With regard to Morgan table, the sample size has been estimated to 641 individuals by separation of groups per their population and the samples have been selected using the stratified random sampling method. The research question was examined and standardized using factor analysis and Cronbach's alpha. Research findings elaborate the component of remote education technology and organizational culture as the dimensions of management and electronic knowledge transfer. It is suggested to the managers at agriculture information and knowledge system to take action to expand the agriculture service centers and equip them with information and communication technology facilities for fast transfer of research findings to farmers and culturalization in sharing the research findings.

Keywords: *village, knowledge management, electronic training, knowledge transfer, agriculture research*

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Introduction

Nowadays, a new method is developing in agriculture development. This development causes multifaceted progress at agriculture sector and moves the villages to a new horizon. The information and communication technology plays a major role in agriculture management, development and improvement by means of increase in efficiency and function of manufacturing units, increase in efficiency of production economy, agriculture notification and promotion. A society which enables to have progress at all areas requires the public access to information and knowledge expansion at all social classes. If modern ICT technologies are provided properly for the farmers and they utilize them properly, this will raise increase in product production, decrease in wastes, accurate management in harvest, and improvement in their lifestyle (GolMohammadi, Motamed, 2009). Agriculture can serve as a main engine for economic growth in developing countries. Fast expansion by spread of mobile phone in developing countries provides a unique opportunity to facilitate approving technology through technology-based information and communication programs and agriculture expansion (Aker, 2010). Involvement of technologies in virtual training causes the learners of this training are subjected to development of new learning methods, new language and new methods and their behaviors and methods of belonging are grounded on values, beliefs, common academic customs, training and virtual space(Mahdavi & Akbari, 2007). Training networking and presence of web technology produce technical and organizational features and a specific culture, paving the way to evaluate training culture at this space (Hart, 1992). Information technology has raised new means for transfer of knowledge in such a way that currently the knowledge transfers faster and among more individuals in organizations (Phang, 2010). Influence of information technology depends on type of transferred knowledge. In general, the information technology is used to manage, transfer, record, store and retrieve objective knowledge so as to have more access to objective knowledge and facilitate its transfer (Onphanhdala, 2012). Virtual training implies web-based learning, represented in a flexible way through electronic means and performed through various methods including learning-based and instructor-based methods. This training is performed through various structures such as courses and modules without any time and place restriction in a concurrent and non-concurrent way; in summary the major approach in these trainings is to bring about the learning for individuals instead to bring about individuals for learning (Mahdizadeh et al. 2007). The most strong means to raise this change is the technology-based information and communication training through creation and development of virtual training environments which are not restricted to any time and geographical position(Lee, 2000), so that in recent years an emphasis has been put on the systems which have backup web-based technology regarding significance of omission of time and place restrictions in training and needing to development in transformational means in training systems(Rokou et al. 2004). With regard to abundance of various media sources at the age of information explosion and main emphasis on economical aspect, integration and more effective use of knowledge and information from these sources by the seekers of knowledge from any class and at any age group for the purpose of suitable and simple access with the least cost and time spending to the required information and knowledge are of great importance (Bruner, 1999). At current age, knowledge and technology have been aligned together which it cannot obtain one of these without the other one. The virtual space by numerous sources and facilities in the context of knowledge and science provided for the users and by the features such as timelessness and placeless ness provided interactivity of numerous capabilities in

the context of training and fostering for the users (Moore, 1989). Establishment of any training system in general and effective virtual training in particular requires interaction by various components. Effective virtual training at the age of information and communication technology requires attention to the considerations relating to the technological infrastructures, pedagogical infrastructure, sociocultural, managerial, administrative and economic infrastructure (Najafi et al. 2014). Expansion of technology at public education, higher education and training adults to face the challenge under increase of demand for training without increase of financial resources and training organizations is constructive (Keshavarzi et al. 2013). With regard to Liau, if the politicians, planners and executors have a positive outlook toward this issue, this will become possible and performed faster (Liau, 2004). The related studies including Iranian and foreign studies have confirmed the possibility to perform this for various social classes (Nasiri, 2003; Klingner, 2003; Al-Harthi, 2003). This goes true among those employed at agriculture sector to increase production regarding the experiences and innovations arisen from the research findings by agriculture research institutes; they can use useful training dimensions of electronic training including low cost, the possibility for better control on learning-teaching process, fast learning content, and ultimately availability of training content and materials at any time and place (Smith, 2004). Black (2004) in his research entitled "comparison of combined, online and traditional methods for representing the courses" indicated that the learners of combined courses prefer the trainings represented in online or traditional method; further under increase in learners' ICT skills, their willingness and satisfaction in use of online and combined methods increase. Ololube et al.(2007) in his research entitled "ICT problems and virtual training in Nigeria" has mentioned the most challenges in Nigeria at the virtual education area included of government policies, lack of budget and capital, organizational problems, infrastructural problems and human capital problem. Schonwald (2003) has mentioned dimensions of stable execution of electronic learning that the most important ones include technology (software and hardware infrastructure for electronic learning); he has put great importance to familiarity of learners and instructors with technology, organizing, culture, communication, strategy and investment management in electronic learning project. Broadbent (2003) has paid attention to culture, content and financial resources in use of electronic learning. Zao and Zheng (2004) in the results from the research entitled "effective factors in learners of training courses in use of information sources" indicated that internet is assumed as the learners' most important information source. In addition, the researchers necessitate the learners' characteristics such as motivation, beliefs and their assurance in creation and development of electronic training to design the training environment and understand the needs of society. Akpabio (2007) in his research entitled "staffs at agriculture promotion and use of information and communication technology in Nigeria" examined the communication level; the results indicated that use of computer communication has been witnessed more among private staffs than public staffs due to the speed of access to agriculture technical information; this research suggests expanding the range of use of information and communication technology among promotion personnel. Wilson (2004), in a study on the related factors regarding the agriculture training and promotion experts to register in online program, witnessed a major difference among promotion promoters and instructors in computer factor systems used at work place, access with intensive discs, use of hardware and network browsers. McCann (2007) in his research entitled "effectiveness of in-service training through virtual training" indicated that promotion personnel are more favorable than internet-based

trainings. Here, the cultural factors have contributed in virtual training (Goldman, 2005). The studies by Warschauer (1998) & Wegerif (1998) have known the virtual learning susceptible to society, culture and environmental factors. Ladson-Billings (1995) knew a significant relationship between cultural context and traditional class training. The studies by Bates(2001), Bentley, J. P. H., Tinney, M. V., & Chia, B. H. (2005), McLoughlin, C. (1999), Smith, A. D. and Rupp, W.T. (2004), Wilson, E. (2004) confirm the effect of culture on network training and learning. The studies by Zao & McLoughlin (2008) on Chinese students at U.S universities display effects of Chinese cultural and social context on coincident network learning. The studies by Al-Harthi (2005) on Arab students in U.S universities displayed the anxiety in these students due to Arab culture in internet learning. The studies by Phang (2007) on Singapore virtual students and the studies by Smith (2005) on Australian and non-Australian students displayed effect of cultural and social context on virtual learning.

Research method

In the present research, the books, theses, articles and database were used to collect data relating to the literature review and Delphi method was used to extract components and sub-components of knowledge management model. The field method (questionnaire) has been used via closed-ended questions to test indices of knowledge management model. To calculate internal consistency of measurement instrument (questionnaire) using software SPSS, Cronbach's alpha test was used that Cronbach's Alpha Reliability Coefficient was obtained equal to 88%. To analyze the obtained data, descriptive statistics methods (frequency, percent, mean and standard deviation) and exploratory factor analysis, Bartlett's Test of Sphericity and the first confirmatory factor analysis via software SPSS and Lisrel were used. It should be noted that the factor loading of the confirmed components via varimax rotation has been confirmed also via software SMART-PLS.

Findings

To achieve major indices after study on articles, literature review and use of the points of view of the academic pioneers who have had the history of knowledge management through virtual teaching, 11 main indices and 70 sub-indices have been recognized via Delphi method that the factor analysis method has been used to validate the components of ques-

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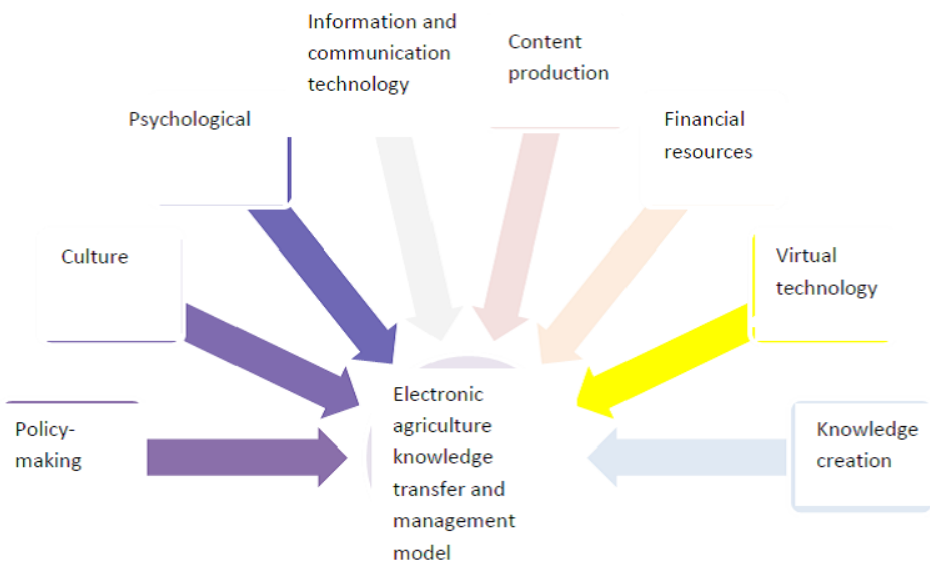

Fig 1. Knowledge management model of agriculture research via electronic teaching

tionnaire. After providing the sample group with questionnaire, data were analyzed via software SPSS 22.00 that 8 components and 32 sub-components were confirmed (fig. 1).
Among these components, 2 components of organizational culture and modern virtual technologies were confirmed. Component of organizational culture includes belief in investment in delivery of research findings by government (0.55) and the culture governing the agriculture research institutes and centers (0.53), belief in delivery of research findings to all users (0.52), belief in knowledge transfer as a value by agriculture knowledge system actors (0.51), team work and the knowledge sharing culture by agriculture knowledge system actors (0.51). Component of modern virtual technologies includes the sub-components of learning through video and web-conference, making visual and auditory relationship between instructor and learner (0.74), message teaching through mobile regarding public access (0.74), learning through social networks and public access and speed of delivery (0.71), represent training through disc (0.70), wiki, weblog and website in transfer of research findings (0.67), a combination of presence learning methods and modern semi-presence training methods (0.58), send training content through email and continuous correspondence between learner and instructor (0.57), indicating positive correlation coefficient. Result from exploratory factor analysis which has been made to confirm validity of questionnaire indices has been represented in table 1. With regard to the results from table 1, it is evident that KMO≥0.78, thus it can have assurance on the findings and make confirmation analyses on them, indicating confirmatory structural validity of the research questionnaire. In the output of given image, since the value of sig is under 5%, it can infer that null hypothesis has not been confirmed at error level (5%), thus H1(adequacy of model) is accepted.
After factor analysis, the component of culture with 5 sub-components and component of virtual learning technology with 7 sub-components were confirmed and these indices have been classified based on Varimax rotation. Drawing the final matrix from Varimax rotation has been neglected, but the dimensions and the components in each dimension have been represented in table 2. The results from factor analysis matrix represented in table 2 indicated that the component of organizational culture determines the value of variance (5.39%) and includes 5 sub-indices regarding significance of the variables, called with the index of organizational culture. In this index, belief in investment in delivery of research findings by government and the culture governing agriculture research institutes and centers has the highest relation in transfer of knowledge by agriculture research institutes to the users through virtual learning; but belief in transfer and acquisition of knowledge as a value by the actors in agriculture knowledge system and team work and the culture of knowledge sharing by the actors of agriculture knowledge system has the least relation in transfer of knowledge by agriculture research institutes to the users through virtual learning. The results from factor analysis matrix represented in table 2 indicated that the virtual

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.739
Bartlett's Test of Sphericity Approx. Chi-Square	7.2813
Df	435
Sig.	0.000

Table 1. KMO test and Bartlett's Test of Sphericity on questionnaire indices

Component	Sub-component	Correlation
Organizational culture	belief in investment in delivery of research findings by government	0.54
	the culture governing the agriculture research institutes and centers	0.53
	belief in delivery of research findings to all users	0.52
	belief in knowledge transfer as a value by agriculture knowledge system actors	0.51
	team work and the knowledge sharing culture by agriculture knowledge system actors	0.51
Virtual technology	send training content through email and continuous correspondence between learner and instructor	0.57
	making visual and auditory relationship between instructor and learner	0.74
	combination of presence learning methods and modern semi-presence training methods	0.58
	message teaching through mobile regarding public access	0.74
	wiki, weblog and website in transfer of research findings	0.67
	learning through social networks and public access and speed of delivery	0.71
	represent training through disc	0.70

Table 2. Results from factor analysis to select two main indices relating to knowledge management through virtual learning via Varimax rotation

fit index	SRMR	GFI	IGFI	NFI	NNFI	CFI
Fitting indexes	0.05	0.90	0.90	0.90	0.90	0.90
Result	0.035	0.94	0.90	0.96	0.96	0.97

Table 3. Fitting indexes of research model

learning technology determines value of variance(11.80%) and includes 7 sub-components, cased with virtual learning technology regarding nature of these variables. learning through video and web-conference, making visual and auditory relationship between instructor and learner, message teaching through mobile regarding public access had the most relation in transfer of knowledge by agriculture research institutes to the users through virtual learning; send training content through email and continuous correspondence between learner and instructor, a combination of presence learning methods and modern semi-presence training methods, had the least relation in transfer of knowledge by agriculture research institutes to the users through virtual learning. According to table 3, the model in terms of Fitting indexes is in a suitable status. The Fitting indexes of the research model have been represented in table.

According to the findings represented in table 3, in each of Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Bentler-Bonett Index or Normed Fit Index (NFI), Tucker–Lewis index (TLI)/nonnormed fit index, the observed value has been considered greater than the index, thus the model is at a suitable

status in terms of fitting.

Discussion and conclusion

Study on factors affecting the electronic knowledge management in empowering the villagers has been the main aim of this research which resulted in detection of factors affecting knowledge management including component of virtual learning technology and organizational culture, that these components are assumed as the main backgrounds of knowledge management. With regard to point of view of instructors, promoters and researchers, a great attention has been paid to internet training courses such as video-conference, social networks, website, wiki, weblog, email, disc and training via message, which this result is consistent with the results from studies by Kurzweil (2013), Najafi et al. (2014), Mahdi zadeh (2009), Kharazi (2010), Keshavarzi (2013), Roku (2000), Moore (1997), Smith (1388), Wilson (1388), Block (1391), Zao and Zhang (1390), Liau (1993) in the component of virtual learning technology. In the component of culture, researchers, promoters and instructors believed the most relation of delivery of research findings by government and the culture governing the agriculture research institutes and centers, transfer and acquisition of knowledge as a value by actors of agriculture knowledge system as well as the teamwork and the culture of knowledge sharing by actors of agriculture knowledge system with knowledge management. This result is consistent with the Hiltz and Goldman (2008), Boyer (1993), Wilson (2001), McLoughlin (2008), Murphy (2005). The most important advantage in electronic learning lies on this fact that it allows the participants to adjust their programs. Flexibility allows the participants to make decision where and when study and how much time spend for learning. Further open-ended and virtual learning with creation of the same conditions for all the learners makes justice and equality among various classes at various places. Using this training method, villages can diminish their gap with the leading villages and cities. On the other hand, easy access to high volume of existing information and knowledge in agriculture research centers and abroad and fast and timely access to information at the shortest time are considered as another advantage of such training. The results from the research findings indicate that the virtual learning approach has been welcomed by the clients especially the current generation due to omission of the time and place limitations for transfer of knowledge and information at agriculture research centers. Therefore, the results from the present research and this study have grounded on this reality that performing this training has been welcomed by the actors of agriculture information and knowledge system. This reveals the high enthusiasm by promoters, farmers and researchers in the

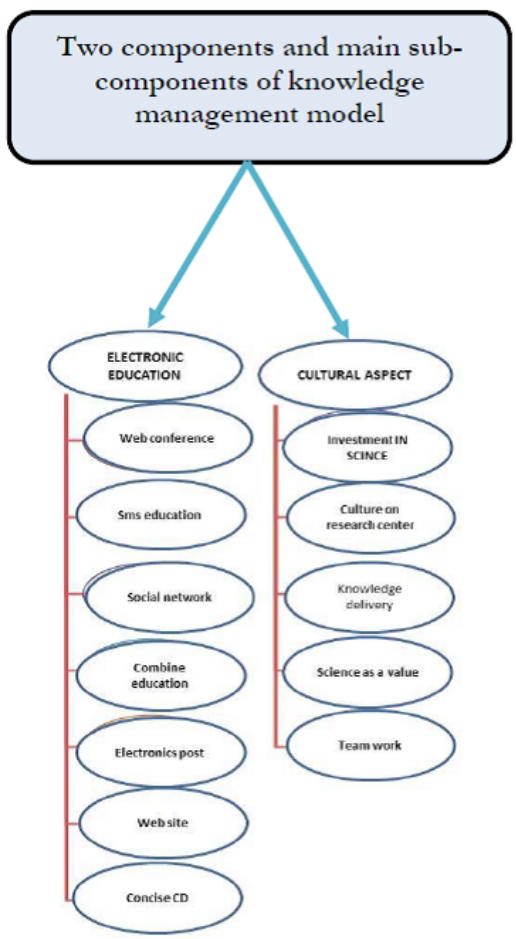

Fig 2. Two components and main sub-components of knowledge management model in agriculture research

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present research with performing dependent on virtual learning and organizational culture. It is suggested to use knowledge management model through virtual learning in transfer of knowledge at agriculture sector so far as the economic situation of farmers improves by fast transfer of research achievements in agriculture research centers and institutes. Providing useful knowledge, access to the world of knowledge and information at agriculture research centers and all over the world causes empowering the farmers and improving agriculture activities, protecting from natural resources, reducing costs, increasing revenues, reducing immigration, efficiency and employment at rural areas.

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