Factors Affecting the Development of Electronic Learning in Agricultural Extension Network in Iran

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Abstract: Nowadays appropriate training and education are important. Many organizations have adopted e-learning as a solution for their corporate training. The Ministry of Agriculture (MoA) also have considered the necessity of e-learning in agricultural extension for training extension agents throughout the country. As a result, understanding factors influencing development of e-learning in Iran's agricultural extension centers is crucial for creating the new opportunities for extension agent to obtain and update their needed information. The purpose of this study was determining the factors affecting the development of e-learning in agricultural extension. Using factor analysis variables were classified into eleven factors. The factors were classified into financial, policy, support, technical, evaluation, educational, cultural, personal, psychological, managerial and organizational factors. Ordinal logistic regression indicated that the 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.

Key words: E-learning · Training and education · Agricultural extension · Iran

INTRODUCTION

In these challenging and rapidly changing times, organizations are becoming more convinced that the only lasting differentiator and source of competitive advantage is their human capital. According to Hall [1], executives increasingly realize that the fate of their companies rests on their employees' ability to absorb information rapidly and learn the skills necessary to adapt to a constantly changing environment. This has led to a rush in finding and adopting a new way of delivering training known as "online learning" or "e- learning". Electronic learning (e-learning) refers to communication and learning activities through computers and networks [2].

Many organizations; institutes; universities; schools and corporations are investing substantial amounts of time and money in developing online alternatives to traditional types of education and training systems. E-learning in agriculture related fields is still in the early phases of adoption. The Ministry of Agriculture (MoA) in Iran like many other organizations and educational centers has considered the necessity of e-learning in agricultural extension network for training extension agents.

Every year extension agents are trained in different on-the-job training courses regularly. Holding such training courses in training centers requires considerable time and money, because extension agents from different offices should leave the office for training centers. With providing online training one can save time and money and train a bigger group simultaneously. Therefore e-learning as a modern approach in training can be used to improve the effectiveness and efficiency of training in extension services [3].

Lippert and Plank [4] also emphasize on Appling e-learning in this cases. They noted that it is an effective, very flexible delivery method and it brings the added benefit of being able to have experts and specialists from different regions and states in the same class without

Table 1: Related references about the factors affecting an e-learning system

Author	Variables or Factors
Rosenberg (2001)	Infrastructure concern, technology concern, connectivity and learning management system [7]
Broadbent (2001)	Human resources, Infrastructure, knowledge and capital [8]
MacDonald, *et al.,* (2001)	Superior structure(learner needs, learning environment, pedagogical, learner evaluation, learner motivation, program goal, strategies, learner convenience), superior content (comprehensive, authentic, industry driven research), superior delivery(usability, interactivity, tools, instructional strategies), superior service(resources, administrative and technical support, staff, accessibility, responsiveness), superior outcomes(lower cost for learner and employer, personal advantages for learner, superior learner outcomes), continual adaptation and improvement, ongoing program evaluation [9]
Kurtus(2002)	Learner, needs of learner, the role of instructor [10]
Surry (2002)	Resources, infrastructure, human, strategies, learning, evaluation, support [11]
Schonwald (2003)	Organization, Technology, Culture, Strategy and Management [12]
Broadbent (2003)	Technology change, business case, Culture, Resources, Leadership, Talent, Speed for change [13]
Rusten and Ramirez(2003)	Connectivity and access, capacity building, content , application development, conducive governance and policy [14]
Neville (2004)	Learner, instructor, technical support and management [15]
Borotis and Poulymenakou, (2004)	Entrepreneur, content, technology, culture, human resources and economic [16]
Jonsson (2005)	Technology, content, instructors and learner [17]
Barajas and Owen (2006)	Infrastructure, hard ware, soft ware, skills, cultural and organizational [18]
Sribhadung (2006)	Use of the internet and acceptable use policies, connectivity infrastructure and network, intergovernmental issues, cost , finance ,partnership intellectual property and copy right [19]
Khan (2008)	Evaluation, interface design, technological, pedagogical, institutional, ethical, resource support, management [20]
Jen-Her, *et al.,* (2008)	Institute, Learner and instructor [21]
Rezaei (2008)	Organizational strategies, Physical infrastructure, policy, knowledge and skill of learner [22]

transportation and lodging costs, many types of learners are receptive to using the Internet and e-learning. Several studies, including one by Lippert and Plank [4] ultimately proved, with strong support of all of the participating learners, that "the Internet can be an effective way to implement an in-service training within the U.S. Cooperative Extension Service." [4] There is little doubt as to e-learning's efficacy for training extension agents, the challenge for the future will be to design and market e-learning directly for the farmers.

MoA usually uses the traditional face-to-face methods to train extension agents, but this methods often fails for several reasons including (1) the number of extension agents is considerably high (6536 persons); (2) the extension agents are scattered throughout the country (in 1213 extension center in 32 provinces); (3) this method of traditional learning is very costly, difficult to manage and implement. It seems that e-learning would be an appropriate solution for solving this problem. On the other hand, according to Karmakar and Wahid [5] developing and expanding e-learning brings many opportunities for organizations including (1) saving time, money and effort; (2) addressing training needs from remote areas; (3) providing self-learning opportunities; (4) having a positive impact on the learning process; (5) providing a mechanism for collaborative learning [5].

Also through the e-learning systems, workers have access to various on-line databases, tools and the most advanced skills that help them find solutions for work-related problems [6].

According to the reasons noted above, this research aimed to determine the factors affecting development an e-learning system in agricultural extension.

Literature Review: In this research, literature review will cover some existing literature on factors affecting electronic learning system. Some variables in the research were selected from previous studies and some others from interviews with some experts in the field of e-learning in agricultural sector. Many studies have identified important variables dealing with an electronic learning system. In Table 1, some of these studies are summarized.

MATERIALS AND METHODS

This is a quantitative research. As far as controlling variables is a descriptive and correlation research. Face validity of the research instrument was done by committee members and some experts in this field. For examining reliability of the research instrument, 30 questionnaires were filled by extension experts in Mazandaran province. For each part of the questionnaire

Table 2: Target and sample population

Province	Total number of extension experts	Sample
Gilan	116	47
West azarbayjan	183	74
Khorasan razavi	192	67
Lorestan	193	72
Isfahan	89	36
Fars	228	83
Total	1021	379

Alpha Cronbach coefficient was separately calculated. Based on the results of this test and the acquired coefficient, some questions were eliminated and some others were modified. In overall the reliability of questionnaire was more than 0.89. Statistical population of the study consisted of 2745 extension expert in the sector of agriculture in Iran. Based on the classification of the Ministry of Agriculture which has divided these centers into six regions, sample taking has been conducted using stratified proportionate random sampling technique. Sample size for the extension expert is 400 persons using Cochran formula. From 400 questionnaires, 379 questionnaires have been returned (Table 2).

Independent variables in the study included factors influencing the e-learning system. The multiple ordinal dependent variable was the perception of extension agents about development of e-learning based on some indexes. The dependent variable was measured by using four indexes including: affordability, availability, adoptability and adaptability arranged by Likert scale.

Finally, all four variables were summarized into a single variable which is our dependent variable. This research used two statistical packages; SPSS 16 and Minitab 15. The data were analyzed using the some techniques includes: exploratory factor analysis and ordinal logistic regression to handle multiple ordinal dependent variables.

RESULTS

The results of descriptive statistics show that the average age of extension agents was 39.66 years old with 15.39 years work experience. The majority of them were male (93%). It was also reported that more than 93% of respondents studied in the filed of agriculture. Table 3 shows the details.

Using factor analysis variables were classified into eleven factors, which are Financial, Policy, Support, Technical, Evaluation, Educational, Cultural, Personal, Psychological, Managerial and Organizational (Table 4). The basic idea of factor analysis is to find a set of latent variables that contain the same information.

Table 3: Descriptive statistics of extension experts

Sex	Female (7%)	Male (93%)
Age/year	Mean = 39.66	SD = 7.65
Work experience/year	Mean = 15.39	SD = 8.14
Management experience/year	Yes (35%)	No (65%)
Education background	Agriculture (93.5%)	Others (6.5%)

Table 4: Classification of factors by using factor analysis

Factor	Variables	Variance by Factor
Financial	Financial sources for buying hard ware equipment	34.87
	Financial sources for buying soft ware equipment	
	Financial sources for maintenance of equipment	
	Financial sources for upgrading and changing pieces	
	Financial sources for basic training on ICT	
	Financial sources for primary training on e-learning	
	Financial sources for supporting and up-to-date training	
	Financial sources for preparing content of educational course	
	Financial sources for preparing digital content	
	Budget for recruitment of experts	
Policy	Comprehensive plan for developing learning technologies	9.86
	Government investment in developing infrastructures for ICT	
	Government policies of e-learning at macro-level	
	the priority of e-learning in Gov. ICT policies	
	programs for encouraging investment in e-learning	
	Improving computer knowledge and skills for all	
	Appointing managers with positive attitude towards ICT	
	Enacting appropriate Acts for e-learning in organizations	
Support	Supporting learner	7.42
	Supporting instructor	
	Incentives for learner for using e-learning	
	Incentives for instructor for using e-learning	
	Continuous support to solve problems	

Table 4: Continued

Technical	Access to appropriate hard ware equipment	4.51
	Access to appropriate soft ware equipment	
	Providing appropriate telecommunication infrastructure	
	Access to internet network	
	Establishment of ICT educational centers	
Evaluation	Continuous evaluation of learners achievements	3.95
	Standard courses development and presentation	
	feedback to learners	
	Educational achievement	
Educational	Shift in approach from teacher-centered to learner-centered approach	3.10
	shift from controlled education to deliberate education free from limitations of time and place	
	Providing the opportunity for learners to analyze learning content	
	New method for iteration and collaboration	
	new methods for organizing the content	
Cultural	Beliefs about electronic learning	2.93
	positive attitude towards the use of modern technology	
	Positive attitude towards life long learning	
	Appreciation ofthe diversity of needs and interests	
Personal	skills of ICT	2.66
	Intention for collaboration and participation in learning process	
	Intention to self-directed and independent learning	
	accepting the facilitator role of trainer	
Psychological	Motivation for learning through electronic devices	1.49
	believing the effectiveness of ICT in learning and training	
	People' attitude to e-learning	
Managerial	Role of management on setting e-learning. in institute	1.23
	Making the organization ready to adopt e-learning	
	establishing quantitative and qualitative standards for e-learning in organization	
Organizational	Consideration Attention to ICT application	1.17
	Readiness of organization to accept e-learning	
	Providing human resources	
Total		73.19

Table 5: Identifying factors affecting the development of e-learning system by ordinal logistic regression

		Dependent variable: development of electronic learning			
Predictor		Coefficient	P-value	Odds ratio	Rank order
Constant	$\acute{a}_1$	0.081	0.909		
	$\acute{a}_2$	1.071	0.116		
	$\acute{a}_3$	2.214	0.001		
	$\acute{a}_4$	2.872	0.000		
	$\acute{a}_5$	4.005	0.000		
	$\acute{a}_6$	4.717	0.000		
	$\acute{a}_7$	5.951	0.000		
	$\acute{a}_8$	6.741	0.000		
Factors	Financial factors(X_1)	0.161	0.025	1.18	5
	Policy Factors(X_2)	-0.226	0.257	0.80	-
	Support Factors(X_3)	-0.116	0.527	0.89	-
	Technical factors (X_4)	-0.106	0.05	0.90	4
	Evaluation factors(X_5)	-0.075	0.671	0.93	-
	Educational factors(X_6)	-0.209	0.269	0.81	-
	Cultural factors (X_7)	-0.226	0.022	0.81	3
	Personal Factors(X_8)	0.177	0.381	1.19	-
	Psychological Factors(X_9)	-0.428	0.005	0.65	1
	managerialfactors (X_{10})	0.375	0.027	1.46	6
	organizational factors(X_{11})	-0.307	0.047	0.74	2

P-Value for test that all coefficients are zero= 0.0

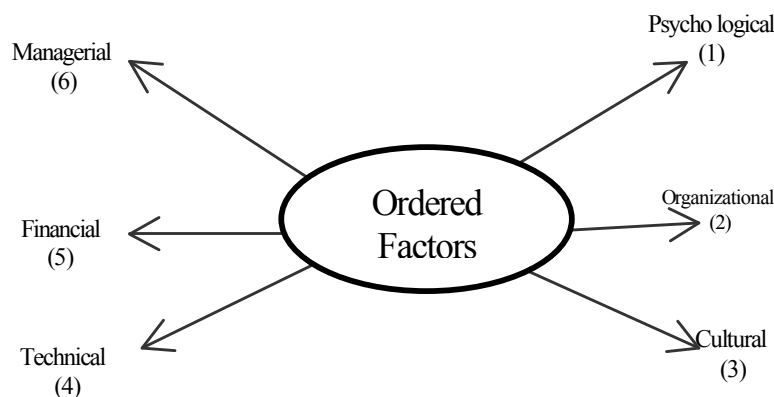P-Value of the Goodness-of-Fit Tests= 0.912

Fig. 1: Factors affecting the development of electronic learning in agricultural extension network in Iran

All variables in this research are ordinal, so ordinal logistic regression was used to identify factors affecting development of e-learning system. As noted before, four variables were used to measure the dependent variables. The median was used to summarize four variables into one single factor. Independent variables are obtained by summarizing into factors, both of which are given in Table 4.

The result of ordinal logistic regression, ordered by the magnitude of their impact, was showed in Table 5 and Fig. 1. Table 5 presents the coefficient, p-value and odds ratio of our ordinal logistic regression analysis. The P-Value indicates that for 0.05 alpha-level, there is sufficient evidence to conclude that, psychological, organizational, cultural, technical, financial and managerial factors are significant factors that affect developing e-learning in agricultural extension. Small odds ratio indicates the order of factor.

Ordinal Logistic Regression Gives an Equation as Follow:

$$\gamma_i = \frac{e^{\left[\alpha_i - .428X_9 - .307X_{11} - .226X_7 - .106X_4 + .161X_1 + .375X_{10}\right]}}{1 + e^{\left[\alpha_i - .428X_9 - .307X_{11} - .226X_7 - .106X_4 + .161X_1 + .375X_{10}\right]}}$$

On the above equation, γ_i is the cumulative probability efficiency of the development of electronic learning of ith level and e=2.17.

DISCUSSION

The psychological factor considers the individual's state of mind as it influences the outcome of the e-learning initiative [23]. Negative preconceptions of e-learning among learner, is the another item, in this scope

[24]. The findings about Psychological factors are in accordance with those of MacDonald, *et al.* [9] and Chapnick [23]. This subject shows that positive preconceptions of an extension agent about e-learning are important for developing any e-learning program.

The findings about organizational factors are in accordance with several authors, such as Schonwald [12], Khan [20], Surry [11], Barajas and Owen [18] and Rezaei [22]. Organizations, not only must understand the potential of e-learning, but to create the appropriate organizational strategies and approaches to try and optimize the benefits they offer for ICT in education [25].

The "culture" is one of key elements of e-learning implementation [13]. An effective e-learning strategy should concern "culture". The importance of cultural factors were pointed out by several authors, such as Schonwald [12], Barajas and Owen [18], Broadbent [13], Borotis and Poulymenakou, [16].

Technical factors consider the question of the proper equipment possession The importance of technical factors was pointed out by several authors, such as Barajas and Owen [18], Khan [20], Omidi *et al.* [25] and Surry [11]. MoA should pay more attention to provide appropriate hardware and software and infrastructure, because technical resources are one of sustainable implementation dimensions of e-learning [12].

Financial factors consider the budget and allocation process. The findings about financial factors are in accordance with those of Khan [20], Omidi *et al* [25], Broadbent [8], Surry [11], Chapnick [23] and Sribhadung [19]. The financial factor plays an important and critical role [13] because the base and setting of e-learning system such as telecommunication infrastructure, buying computer, access to internet, Expense of maintenance of equipment and other ICT resources needs financial and credit and continuing e-learning projects needs

investment [16]. It shows that MoA should be allocating the necessary budgets and secure the cost of training would have affect on the e-learning.

Lack of managerial skills and ability is another factor that is known as challenge for e-learning [26].The findings about managerial factors are in accordance with those of Schonwald [12], Khan [20] and [27]. Therefore the MoA managers on all level must have a special consideration to e-learning.

CONCLUSION

It is obvious that many communities are trying to limit traditional training delivery methods and using e-learning instead. Extension agents play a crucial role in agricultural extension; therefore to accomplish this role in the best manner there is a need of applying new and effective methods to train extension experts in this field.

But e-learning in Iran's agricultural extension is still in the early phases of adoption. It is clear that there are many factors that can delay or increase the development of e-learning in agricultural extension.

For access to this goal, finding factors influencing the development of electronic learning in agricultural extension is necessary. This research, found some of factors including: psychological, organizational, cultural, technical, financial and managerial. According the results, extension agents should change their preconception and make positive attitude to e-learning and its effectiveness in learning and training process. On the other hand extension organization should involve appropriate strategies and approaches to try and optimize the benefits of ICTs in education.

Now, there are no adequate equipments in extension centers. The extension organization should pay more attention to provide appropriate hardware and software and infrastructure, to be successful in e-learning projects.

Despite receiving the high amount of budget by MoA, a few amount of that allocate to ICTs programs. The MoA and extension organization should be allocate the necessary budgets and secure the cost of training by e-learning methods.

All above mentioned factors can were influenced by managerial factor The MoA and extension organization managers should have a special consideration to e-learning and pursued their employees to use and apply the new and effective method of learning and education.

Anyway, this research founded factors that are crucial and important. These factors should be considered in developing any e-learning programs in agricultural extension network in Iran.

REFERENCES

1. Hall, B., 2000. Learning goes online: how companies can use networks to turn change into a competitive advantage. Cisco Systems: Packet Magazine. [online]. Available at: http://www.sciencedirect.com/science?_ob=Redire ctURLand_method=externObjLinkand_locator=urla nd_cdi=6554and_plusSign=%2Band_targetURL=h ttp%253A%252F%252Fwww.cisco.com%252Fwarp %252Fpublic%252F784%252Fpacket%252Fjul00%2 52Fp58-cover.html. Accessed September 2001.

2. Tsai, S. and P. Machado, 2002. E-learning, online learning, web-based learning, or distance learning: Unveiling the ambiguity in current terminology. http://www.elearnmag.org/subpage.cfm?section=b est_practicesandarticle=6-1

3. Hemmati, A. and E. Sefidian, 2006. E-learning and investigation on its application in on-the job training for the staff of AREO, Proceeding of the Iranian agricultureal education seminar, Tarbiat Modares University, Iran, 1-2 Nov. 2006, pp: 221-232.

4. Lippert, R.M. and C.O. Plank, 1999. Response to a first time use of internet inservice training byagricultural extension agents. J. Nat. Resour. Life Sci. Educ., 28: 53-56.

5. Karmakar, C.K. and CM. Wahid, 2009. Recommendations for Bangladesh towards e-learning readiness. Department of computer science. Shah Jalal University of science and technology. http://www.codewitz.net/papers/MMT_97-102_Karmakar_Wahid%20.pdf

6. Zhang, D. and J.F. Nunamaker, 2003. Powering e-learning in the new millennium: An overview of e-learning and enabling technology. Inform. Syst. Front., 5(2): 207-218. DOI: 10.1023/A:1022609809036

7. Rosenberg, M.J., 2001. E-learning, Strategies for Delivering Knowledge in the Digital Age. McGraw-Hill Companies, New York. ISBN 0-07-136268-1, pp: 344 .

8. Broadbent, B., 2001. Championing e-Learning. http://www.brookebroadbent.com/resources/Cham pioning+e-Learning.pdf.

9. MacDonald, C.J., E. Stodel, L. Farres, K. Breithaupt and M.A. Gabriel, 2001. The demand driven learning model: A framework for web-based learning. Internet Higher Educ., 1: 9-30.

10. Kurtus, R., 2002. Initial considerations before designing e-learning, CBT or WBT. http://www.school-for-champions. com/ elearning/ initialconsid. htm

11. Surry, D.W., 2002. A model for integrating instructional technology into higher education. Proceeding of the Conference on American Educational Research Association, Apr. 2002, New D.W. Orleans,

12. Schonwald, I., 2003. Sustainable implementation of e-learning as a change process at universities. 9th Online Educa Berlin, December 3-5, Berlin.

13. Broadbent, B., 2003. Getting a bigger slice of e-learning pie. http://www. brookebroadbent. com/resources/Bigger+slice+of+pie .pdf

14. Rusten, E. and S. Ramirez, 2003. Future direction in agriculture and Information and Communication Technologies (ICTs) at USAID, The academy for educational development and winrock international, 14 February 2003; http://www. winrock.org/agriculture/files/ag_ict. pdf

15. Neville, K., 2004. A Government crossing the digital divide to promote ICT for adult learners. Elect. J. e-Learn., 2: 145-158. http://www. ejel.org/volume-2/vol2-issue1/issue1-art1-neville. pdf

16. Borotis, S.A. and A. Poulymenakou, 2004. e-Learning Readiness Components: Key Issues to Consider Before Adopting e-Learning Interventions. In J. Nall and R. Robson (Eds.), Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare and Higher Education Washington, DC, USA, 2004, pp: 1622-1629.

17. Jonsson, B.A., 2005. A case study of successful e-learning: A web-based distance course in medical physics held for school teachers of the upper secondary level. Med. Eng. Phys., 27: 571-581.

18. Barajas, M. and M. Owen, 2000. Implementing virtual learning environments: Looking for a holistic approach Educational Technology and Society 3(3),pp: 39-53. http://www. ifets. info/ journals/ 3_3/barajas. html

19. Sribhadung, R.A.P., 2006. Mobile device in e-learning. Third International Conference on eLearning for Knowledge-Based Society, August 3-4, 2006, Bangkok ,Thailand pp: 35.1-5. http://www.ijcim.th. org/v14nSP1/pdf/p35.1-5-fin-18. pdf.

20. Khan, B.H., 2008. Elements of e-learning quality. http://elexforum.etqm.ae/Archive/2008/downloads/ Presentations/Post%20Forum%20Workshops/Day %201/Elements%20of%20e-Learning%20Quality% 20by%20Badrul%20Khan/Elements%20of%20e-Learning%20Quality%20by%20Badrul%20Khan.pdf

21. Jen-Her, W., R.D. Tennyson, T. Hsia and Y. Liao, 2008. Analysis of E-learning innovation and core capability using a hypercube model. Comput. Hum. Behav., 24: 1851-1866.

22. Rezaei, M., 2008. Investigate strategies of appling and developing of electronic learning system in Iran's higher agricultural education Ph.D. dissertation. Tehran university, Iran

23. Chapnick, S., 2000. Are you ready for e-learning? Learning Circuits: ASTD's Online Magazine All About ELearning, retrieved December 2, 2008 from http://www.astd.org/LC/2000/1100_chapnick.htm

24. Homan, G. and A. Macpherson, 2005. E-learning in corporate universities. J. European Industrial Training, 29(1): 75-90.

25. Omidi Najafabadi, M., J. Farajollah Hosseini, M. Mirdamadi, R. Moghadasi, 2008. Designing an Efficient Information and Communication Technology (Ict) System to Train Private Agricultural Insurance Brokers in Iran. Australian J. Basic and App. Sci., 2(4): 1041-1051.

26. Ebadi, R., 2005. IT and education. Institute of intellectual schools and Educational Technology Develop.,

27. Karimi, A.R., 2007. Assessment and Qualitative Analysis of Capabilities of e-Learning in Iran's Higher Education System, M.S. Thesis, Tarbiat Modares University, Iran.