Hospital information system acceptance among the educational hospitals

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Abstract

Context: Acceptance of individuals and the use of technology by users are an important factor.

Aims: This study is aimed to investigate the acceptance of the hospital information system (HIS) among the educational hospitals.

Setting and Design: Educational hospitals of Mazandaran University of Medical Sciences, cross-sectional study.

Materials and Methods: This study conducted in 2018. Census sampling method was used, and the sample of this study was 400 nurses, physicians, and paramedical staff. In this study, the unified theory of the acceptance and use of technology (UTAUT) questionnaire was used for data collection.

Statistical Analysis Used: The present study has been analyzed using structural equation modeling.

Results: The results demonstrated that the behavioral intention (BI) to use HIS was predicted by performance expectancy ($\beta = 2.08, P < 0.05$), effort expectancy ($\beta = 3.73, P < 0.01$), and social influence ($\beta = 6.83, P < 0.01$). Furthermore, use behavior was predicted by facilitating conditions ($\beta = 2.96, P < 0.01$) and BI ($\beta = 8.15, P < 0.01$). These antecedents, respectively, determined 61% and 59% of the variance of BI and use behavior ($R2 = 0.61, 0.59$).

Conclusions: The results of this study showed that the acceptance of HIS, directly and significantly influenced by the UTAUT model.

Keywords: Delivery of healthcare, Hospital information systems, Unified theory of acceptance and use of technology

INTRODUCTION

Hospitals have a variety of information systems that are used to provide accurate and effective information,[1] one of the most important systems is the hospital information system (HIS). This system is a comprehensive software package for integrating patient information among wards and treatment centers in order to expedite the care process, increase satisfaction, improve service quality, and reduce costs.[2] This system not only improves decision-making in health and treatment but also plays an important role in the development of organizational performance by providing patient information and record.[3]

Due to the advent of new technologies, the medical community needs to find a better way to provide better health services.[4] Previous studies have shown that health workers play an important role in the acceptance and evaluation of HISs.[5-7] Health workers have the main effect on the development of health-care systems because they share health information that affects the health and treatment of patients.[8] The rapid growth of information technology (IT) investment in the world has made user acceptance into an important issue in the implementation and management of technology.[9] Acceptance of individuals and the use of technology by users are an important factor in the success of the implementation of IT.[10]

Based on Dwivedi *et al.*, in 2019, first formalized an alternative theoretical model for explaining the acceptance and use of information system and IT innovations. It showed that attitude: Was central to behavioral intentions and usage behaviors, partially mediated the effects of exogenous constructs on behavioral intentions, and had a direct influence on usage behaviors.[11] According to the Engin and Gürses study performance expectancy (PE), effort expectancy (EE), and social influence (SI) variables have positive and significant effects on the behavioral intention (BI) of hospital staff for using of HISs. In addition, facilitating conditions (FC) and BI variables have a positive and significant effect on usage behavior. On the other hand, it was found that gender has a moderator effect on the relationship between PE, EE and BI. Experience has a moderator effect on the relationship between the SI and the BI while age has a moderator effect on the relationship between FC and use behavior.[12]

In this model, there are four factors in the intention of individuals to use technology, which include: PE, EE, SI and FC.[13] In addition to the four factors, moderating factors also play important roles such as gender, age, and experience.[14]

According to Venkatesh *et al.* (2003), PE means the degree that a person believes, using this system will help him to succeed in his career.[15] According to the findings of the studies, the strongest factor in the individual's intentions is PE.[16,17] PE is positively related to BI. This factor consists of five structures: perceived usefulness, outcome expectations, job-fit, relative advantage, and extrinsic motivation.[18] EE is defined as the ease of use of technology[19] and the level of comfort felt when using IT.[20] SI is the level of individual belief that other people who are important to the person believe that he/she needs to use the new technology.[21] FC mean that the person believes that the organization and technical infrastructure are available to support the use of technology.[22] These structures play an important role in understanding people's usefulness, increasing productivity, and the role of individuals in a positive effect in the workplace.[13] Considering the role of IT in reducing the costs imposed on the health system, increasing patient and staff satisfaction, productivity, and finally improving the quality of provided care services,[23,24] the purpose of this study was to examine the factors affecting acceptance of hospital IT by nurses, physicians and paramedical staff of educational hospitals of Mazandaran University of Medical Sciences using the Unified Theory of Acceptance and Use of Technology (UTAUT). The main objective of this study was to investigate the factors affecting the acceptance of HIS based on the UTAUT in educational hospitals of Mazandaran University of Medical Sciences.

MATERIALS AND METHODS

The present study was a cross-sectional study conducted in 2018, which has been analyzed using structural equation modeling (SEM). Census sampling method was used, and the sample of this study was 400 nurses, physicians and paramedical staff of educational hospitals (at least 5–10 sample for each question in UTAUT questionnaire) (Bu-Ali Hospital, Imam Khomeini, Fatemeh Zahra and Zare of Sari) of Mazandaran University of Medical Sciences, which do all or part of their activities with the HIS. Educational hospitals included Bu-Ali Hospital, Imam Khomeini, Fatemeh Zahra, and Zare of Sari. These hospitals have a HIS that is responsible for the registration, collection, integration, reporting, and transmission of medical, diagnostic, and clinical data, and systems that were solely for finance are not included in this study. Inclusion criteria were working with HIS for at least 1 year, intention for participation, exclusion criterion was failure to complete the questionnaire.

A total of 400 participants were enlisted in 2018 from July to September to complete the UTAUT questionnaire to

collect data. A section was added to the beginning of the questionnaire, in which the purpose of the data collection and the importance of the respondent's cooperation in completing were written. Then, general and demographic data were collected regarding respondents', age, sex, education, and daily use of HIS. UTAUT questionnaire included 36 questions, including PE variables, EE, FC, and SI. The reliability and validity of the Persian version of this questionnaire were approved by Najafi *et al*.[25] The questionnaire was presented for 3 months in hospitals from July to September and in all shifts, and respondents filled out questions if they were satisfied and volunteer. Depending on the specific circumstances of some sectors, it was not possible to fill in the questionnaire.

In the first step, SPSS software version 16 (IBM, Armonk, NY, USA) was used for descriptive analysis of variables. The reliability of each of the factors of the UTAUT model was assessed using Cronbach's alpha. In the next stage, the confirmatory analysis and SEM techniques were used to check and validate the assumptions of the study using Amos software version 16.

To assess the normality, the univariate and multivariate normality indices were used. Multivariate normality is one of the important assumptions in SEM.[26,27] Univariate distributions were used for outlier data, skewness, and curvature. Multivariate distributions were used to check the normalization of multivariate outliers. Mardia test was used to assess multivariate normality. The coefficient and multivariate outliers were also investigated by Mahalanobis distance.[28]

To evaluate the internal consistency of the UTAUT, the Cronbach's alpha coefficient was considered to be >0.7 for the internal stability of the questionnaire. Although some sources report that the optimal alpha should be at least 0.9,[28] construct reliability should be calculated for concealed structures if it was above 0.7.[29] To establish convergent validity, the Average Variance Extracted (AVE) must be higher than 0.5, and to confirm the divergent validity, maximum shared variance (MSV) and average shared variance (ASV) must be less than AVE.[30]

Some items in the confirmatory factor analysis (CFA) that have the loading factor more than 0.5 were stayed in the model [Table 1],[31] and in the second step, the confirmed factors that were verified using CFA, were entered in SEM Chi-square test was used for the goodness of fit in the model, but since this index is sensitive to the sample size, it rejected the model with a significant level of $P < 0.05$.[32] Therefore, we used maximum likelihood

estimation. In Table 2, the fitting indices of the model were presented.

In this study, SEM was used to study the effects of independent variables on dependent variables. The main purpose of the application of SEM is to estimate the value of the observed parameters (endogenous) and hidden (exogenous). An endogenous variable is defined as a variable that is influenced by other variables in the model and is in contrast to the exogenous variables that do not receive any effect from other variables in the model.[33] Since there are several independent variables in the present study, the use of the structural equation model is necessary that their effects on the dependent variable should be considered. This study approved by the Committee of Ethics in Research at this university under the code IR.MAZUMS.REC.1398.1628:

RESULTS

The results showed that 89.5% of the respondents were female, 10.5% were male, and 85% of all respondents were between 25 and 40 years.

Table 1 showed each construct's related Cronbach's alpha and the square root of AVE. An alpha value of 0.70 or above was considered to be the criterion for demonstrating the internal consistency of the scales (Nunnally 1994). The internal consistencies of the constructs were considered acceptable (Cronbach's alpha 0.92). Cronbach's alpha did not increase by eliminating any of the items. The results demonstrated that BI to use HISs was predicted by PE (β = 2.08, $P < 0.05$), EE (β = 3.73, $P < 0.01$), SI (β = 6.83, $P < 0.01$) and FC (β = 2.84, $P < 0.01$).

The effect of the use behavior on the BI was (β = 8.15, $P < 0.01$) and the effect of the use behavior on the facilitating condition was equal to (β = 2.97, $P < 0.01$). Nurses, physicians, and paramedical staffs intention to use HIS was predictable by PE (β = 2.08, $P < 0.05$, EE β = 3.73, $P < 0.01$), SI (β = 6.83, $P < 0.01$) and FC (β = 2.84, $P < 0.01$). Intention to use HIS was predictable by PE (β = 2.08, $P < 0.05$, EE β = 3.73, $P < 0.01$), SI (β = 6.83, $P < 0.01$) and FC (β = 2.84, $P < 0.01$). The effects of these antecedents of BI determined 61% of the variance in intention to use HISs ($R^2 = 0.61$). The impact of BI of 61% determined the variance of intention to use HIS. Also, use behavior was also 59% (R2 = 0.59).

Application of the research model suggested that nurses, physicians, and paramedical staffs' acceptance of HISs were influenced by PE, EE, SI, and FC, with SI having

Table 1: Factor loading, Cronbach's Alpha and square root of average variance extracted for each construct

Construct	Indicator	Loading	Cronbach's alpha	CR	AVE	MSV	ASV
Performance expectancy	Q1	0.84	0.87	0.89	0.672	0.278	0.217
	Q2	0.89					
	Q3	0.70					
	Q4	0.74					
Effort expectancy	Q5	0.83	0.90	0.90	0.742	0.215	0.155
	Q6	0.87					
	Q7	0.88					
Social influence	Q8	0.69	0.79	0.86	0.545	0.345	0.265
	Q9	0.69					
	Q10	0.71					
	Q11	0.50					
	Q12	0.64					
Facilitating conditions	Q13	0.57	0.84	0.84	0.521	0.307	0.243
	Q14	0.56					
	Q15	0.74					
	Q16	0.61					
	Q17	0.72					
Behavioral intention	Q18	0.80	0.75	0.77	0.525	0.521	0.332
	Q19	0.60					
	Q20	0.67					
Use behavior	Q21	0.78	0.91	0.93	0.756	0.521	0.283
	Q22	0.95					
	Q23	0.87					
	Q24	0.87					

CR: Construct reliability, AVE: Average variance extracted, MSV: Maximum shared variance, ASV: Average shared variance

Table 2: The actual and recommended values of fit indices

Fit index	χ^2/df	TLI	IFI	CFI	NFI	RMSEA
Recommend value	<3	>0.90	>0.90	>0.90	>0.90	<0.08
Actual value	2.73	0.91	0.93	0.93	0.90	0.068

RMSEA: Root mean square error of approximation, CFI: Comparative Fit Index, TLI: Tucker-Lewis Index, IFI: Incremental Fit Index, NFI: Normed Fit Index

the strongest effect on user intention. The results of this study showed that HIS acceptance was affected by PE, EE, SI, and FC. Furthermore, SI has had the most impact on users' intentions.

Table 2 shows the results of the fittest modeling of structural equations calculated by Amos software. Table 3 also presented the results of the evaluation of the hypotheses of the study. The direct and indirect effects and the overall effect of different factors on each other also indicated the significance of these effects. Figure 1 shows the fitted conceptual model of the study by SEM.

According to the reported indices, fitting of the appropriate model was evaluated, and most of the loading factors were >0.5, indicating that the minimum acceptable loading factor. In the CFA, the results of the Chi-square test were obtained. Then, to evaluate the fitting of the model, other indicators were examined. According to Table 3, all indicators confirmed the fitness of the final model., AVE, for all factors was larger than 0.5 and also the AVE of each factor was larger than ASV and MSV [Table 1]. The results

showed that the UTAUT construct had suitable convergent and divergent validity.

DISCUSSION

The results of this study showed that BI to use HIS by SI ($\beta = 6.83$, $P < 0.01$), EE ($\beta = 3.73$, $P < 0.01$), FC ($\beta = 2.84$, $P < 0.01$) and PE ($\beta = 2.08$, $P < 0.05$). The results of this study have a positive and significant effect on PE, EE, SI, and FC in predicting BI of staffs as main constituents and finally, UATAUT model is confirmed. Therefore, SI, EE, FC, and PE had a positive effect on the behavior of staff in relation to HIS. In confirmation of these results, the results of the study conducted by Aggelidis and Chatzoglou showed that the four main structures of the UTAUT model significantly influenced the intention of the hospital staff to accept HIS.[34] The study of Sharifian *et al*., also related to the factors influencing HIS acceptance, showed that all four constructs of the UATAUT model significantly influenced the intention of nurses to use HIS.[20,21]

Furthermore, in the present study, SI was the strongest predictor of BI. This factor consists of three structures: The subjective norm, social factors, and perceptions. Several studies have confirmed the essential role of SIs on behavioral intent and decision-making.[34-36] Several studies have examined the SI on technology acceptance, but the findings of these studies are contradictory. Davis *et al*.[37] and Mathieson[24] found that there was

Table 3: The results of testing the hypotheses

Hypotheses	Effects	T	Direct effect	Remarks	Indirect effect	Remarks
H1	PE → BI	2.08	0.14	Supported	PE → UB=0.09	Supported
H2	EE → BI	3.73	0.20	Supported	EE → UB=0.13	Supported
H3	SI → BI	6.83	0.58	Supported	SI → UB=0.37	Supported
H4	FC → UB	2.96	0.20	Supported	-	-
H5	BI → UB	8.15	.63	Supported	-	-

PE: Performance expectancy, BI: Behavioral intention, EE: Effort expectancy, SI: Social influence, FC: Facilitating condition, UB: Use behavior
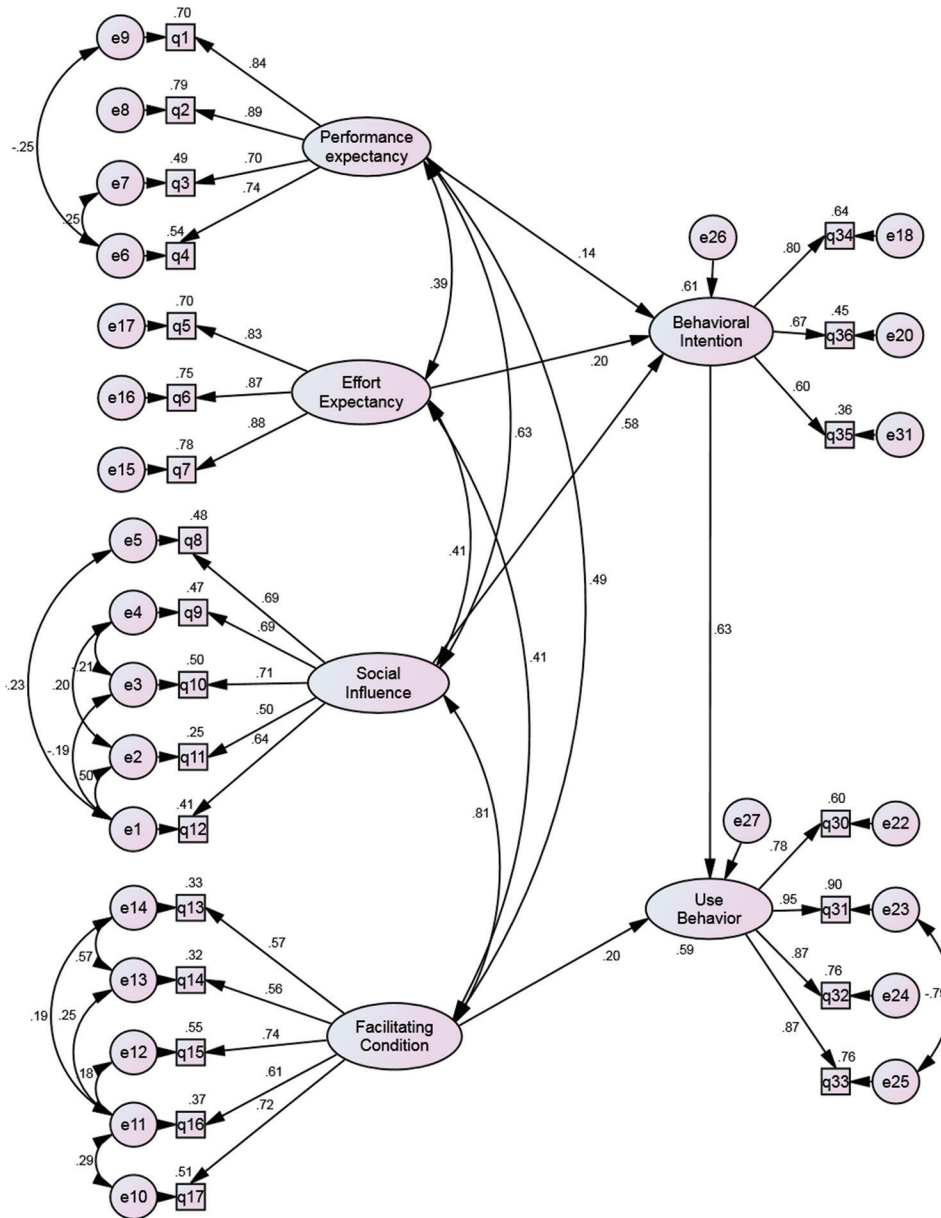

Figure 1: The fitted conceptual model of study by structural equation modeling

a weak relationship between subjective norms and BI. Jeng and Tzeng also found that there was no significant relationship between SI and the intention to use the clinical decision support system (CDSS) in assessing the predictive factors affecting the intention of the health-care professionals in the use of the CDSS. It seems that the reasons for the inconsistency of this finding with the present study were the differences in the type of system desired by users.[38]

While Moore and Benbasat,[39] Taylor and Todd[36] and Thompson *et al*. (1991)[40] found a significant relationship

in this field. Bennani and Oumlil also looked at the factors influencing IT acceptance based on the UTAUT model and reported that among the model structures, SI had the greatest impact on BI in using IT.[41] Wills *et al*. also evaluated the acceptance of nurses and their use of the Electronic Medical Record (EMR), and found that among the UATAUT model constructs, SI had the most direct impact on nursing behavioral intent on using IT.[42] The study of Hennington *et al*., which examined the experiences of nurses using the EMR, also showed that there was a strong relationship between the intention to use the EMR system and SI.[43] When a person is double-minded in selecting a behavior, he/she often considers others' opinion to decide on the right behavior, and when people get more information in this way, they are more confident in the selected behaviour.[44] Therefore, when users of a system experience the benefits of easy use of HIS, users of a system will benefit from HIS.

Use behavior has a direct and significant effect on the BI (β = 8.15, $P < 0.01$) and FC (β = 2.97, $P < 0.01$). These results were consistent with the result of the study conducted by Phichitchaisopa and Naenna (2013).[45] In relation to FC, this finding was consistent with the study of Kijsanayotin *et al*. (2009),[46] Zhou *et al*. (2012),[47] and Rouibah *et al*. (2009)[48]

This finding suggests that infrastructure support, such as computer systems or knowledge is one of the essential components of the actual use behavior of HIS. The internal and external organizations, which are part of the FC, provide users, and especially physicians, with an opportunity to influence their behavior. Internal organizations include healthcare support provided through technical assistance for the use of health-care technology provided through technology staff. Some physicians may have some of the knowledge they need to use health-care technology. Therefore, there is a need to recruit IT personnel in health care to provide support for health-care technology. Ministry of Health is one of the external organizations in each country, which can play a significant role in improving IT in healthcare and reducing the costs associated with launching the HIS system.[49] Therefore, there is a need for support from internal and external organizations such as IT personnel and technical resources.

In the present study, the impact of SI, EE, and PE totally determined 61% of the variance of intention to use HIS. The effect of FC and BI has also determined 59% of the variance of use behavior. Phichitchaisopa and Naenna, (2013), examined the factors influencing HIS selection based on the UATAUT model in Thailand indicating the effect of the main predictors of BI based on the UATAUT model was 26% of the BI and 20% of the variance of use behavior.[45] Sharifian *et al*. also reported that the predictive effect of BI in the UTAUT model was 72.8% of the variance in the BI of nurses in accepting the use of HIS.[21] According to the results of the study performed by Wills *et al*., the UTAUT model determined 51% of BI variance and 28.2% of the variance of the use behavior.[42]

The large sample size of the present study, high response rate (94%), and the use of a diverse sample including nurses, physicians, and paramedical staff using HIS were the strengths of this study, which can be more reliable in generalizing the findings. Considering that most participants in this study were female (89.5%) and under the age of 40 (85%), it could be biased. Therefore, it is recommended that future studies of different ages and both sexes were used in the study. From a managerial point of view, the findings of this study can be a useful tool for proposing hospital managers who need to examine the effectiveness of integrating new technologies in their organization. Furthermore, the results of this study will help managers to understand the enhancers of HIS acceptance by health-care providers.

CONCLUSIONS

The results of this study showed that the intention to behavior nurses, physicians, and paramedical staff is directly and significantly influenced by SI, EE, FC, and improved performance. However, the most predictive of BI is provided by SI constructs. Furthermore use behavior construct has been directly and significantly influenced by the intention of behavior and FC.

REFERENCES

1. Handayani PW, Hidayanto AN, Pinem AA, Hapsari IC, Sandhyaduhita PI, Budi I. Acceptance model of a hospital information system. Int J Med Inform 2017;99:11-28.

2. Abdelhak M, Grostick S, Hanken M, Jacobs E. Health Information: Management of a Strategic Resource. 3rd ed. Philadelphia: WB Saunders; 2007.

3. Chuck W. Management: Planning and Decision Making. Washington DC: Thompson Pub; 2006.

4. Romano CA. Innovation. The promise and the perils for nursing and information technology. Comput Nurs 1990;8:99-104.

5. Dwivedi YK, Kapoor KK, Williams MD, Williams J. RFID systems in libraries: An empirical examination of factors affecting system use and user satisfaction. Int J Inf Manage 2013;33:367-73.

6. Marin HF. Nursing informatics: Advances and trends to improve health care quality. Int J Med Inform 2007;76 Suppl 2:S267-9.

7. Sinha RK, Kurian S. Assessment of end user satisfaction of hospital information system informatic Al Spitalului. Manage Health 2014;8:26-33.

8. Wakefield DS, Halbesleben JR, Ward MM, Qiu Q, Brokel J, Crandall D. Development of a measure of clinical information systems expectations and experiences. Med Care 2007;45:884-90.

9. Hu PJ, Chau PY, Sheng OR, Tam KY. Examining the technology acceptance model using physician acceptance of telemedicine technology. J Manage Inf Syst 1999;16:91-112.

10. Giuse DA, Kuhn KA. Health information systems challenges: The Heidelberg conference and the future. Int J Med Inform 2003;69:105-14.

11. Dwivedi YK, Rana NP, Jeyaraj A, Clement M, Williams MD. Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. Inf Syst Front 2019;21:719-34.

12. Engin M, Gürses F. Adoption of hospital information systems in public hospitals in Turkey: An analysis with the unified theory of acceptance and use of technology model. Int J Innov Tech Manage 2019;16:1950043.

13. Holden RJ, Karsh BT. The technology acceptance model: Its past and its future in health care. J Biomed Inform 2010;43:159-72.

14. Shibl R, Lawley M, Debuse J. Factors influencing decision support system acceptance. Decis Support Syst 2013;54:953-61.

15. Venkatesh V, Michael G, Morris, Gordon B, Davis, Fred D. User acceptance of information technology: Toward a unified view. MIS Quarterly 2003;27:25-478.

16. Duyck P, Pynoo B, Devolder P, Voet T, Adang L, Vercruysse J. User acceptance of a picture archiving and communication system. Applying the unified theory of acceptance and use of technology in a radiological setting. Methods Inf Med 2008;47:149-56.

17. Gomes CM, Farias JS. The influence of performance expectancy and effort expectancy on the use of a purchasing application in Brazil. Contabilidade Gestao Governanca 2017;20:72-90.

18. Ghalandari K. The effect of performance expectancy, effort expectancy, social influence and facilitating conditions on acceptance of e-banking services in Iran: The moderating role of age and gender. Middle East J Sci Res 2012;12:801-7.

19. Zuiderwijk A, Janssen M, Dwivedi YK. Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology. Gov Inf Q 2015;32:429-40.

20. Gwebu KL, Wang J. Adoption of open source software: The role of social identification. Decis Support Syst 2011;51:220-9.

21. Sharifian R, Askarian F, Nematolahi M, Farhadi P. Factors influencing nurses' acceptance of hospital information systems in Iran: Application of the unified theory of acceptance and use of technology. Health Inf Manag 2014;43:23-8.

22. Rana NP, Williams MD, Dwivedi YK, Williams J. Theories and theoretical models for examining the adoption of e-government services. e-Service J 2012;8:26-56.

23. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Q 1989;13:319-40.

24. Mathieson K. Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. Inf Syst Res 1991;2:173-91.

25. Najafi N. Effective Factors for Adoption of Electronic Patient Record between Physician Using the Unified Theory of Acceptance and Use of Technology (UTAUT). Shiraz: Payam Nour; 2010.

26. Kline RB. Principles and Practice of Structural Equation Modeling. New York City: Guilford Publications; 2015.

27. McDonald RP, Ho MH. Principles and practice in reporting structural equation analyses. Psychol Methods 2002;7:64-82.

28. Ullman JB. Structural equation modeling: Reviewing the basics and moving forward. J Pers Assess 2006;87:35-50.

29. Fornella C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. J Mark Res 1981;18:39-50.

30. Ahadzadeh AS, Sharif SP, Ong FS, Khong KW. Integrating health belief model and technology acceptance model: An investigation of health-related internet use. J Med Internet Res 2015;17:e45.

31. Nia HS, Sharif SP, Goudarzian AH, Haghdoost AA, Ebadi A, Soleimani MA. An evaluation of psychometric properties of the Templer's Death Anxiety Scale-Extended among a sample of Iranian chemical warfare veterans. J Hayat 2016;22:229-44.

32. Hooper D, Coughlan J, Mullen M. Structural equation modelling: Guidelines for determining model fit. Electronic Journal of Business Research Method 2008;6:53-60.

33. Bowen NK, Guo S. Structural Equation Modeling. United Kingdom: Oxford University Press; 2011.

34. Aggelidis VP, Chatzoglou PD. Using a modified technology acceptance model in hospitals. Int J Med Inform 2009;78:115-26.

35. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Processes 1991;50:179-211.

36. Taylor S, Todd PA. Understanding information technology usage: A test of competing models. Inf Syst Res 1995;6:144-76.

37. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: A comparison of two theoretical models. Manage Sci 1989;35:982-1003.

38. Jeng DJ, Tzeng GH. Social influence on the use of clinical decision support systems: Revisiting the unified theory of acceptance and use of technology by the fuzzy DEMATEL technique. Comp Ind Eng 2012;62:819-28.

39. Moore GC, Benbasat I. Development of an instrument to measure the perceptions of adopting an information technology innovation. Inf Sys Res 1991;2:192-222.

40. Thompson RL, Higgins CA, Howell JM. Personal computing: Toward a conceptual model of utilization. MIS Q 1991;15:125-43.

41. Bennani AE, Oumlil R. IT acceptance by nurses in morocco: Application of a modified unified theory of acceptance and use of technology. IBIMA Bus Rev 2014;2014:1.

42. Wills MJ, El-Gayar OF, Bennett D. Examining healthcare professionals' acceptance of electronic medical records using UTAUT. Issues Inf Syst 2008;9:396-401.

43. Hennington A, Janz B, Amis J, Nichols E. Information systems and healthcare XXXII: Understanding the multidimensionality of information systems use: A study of nurses' use of a mandated electronic medical record system. Commun Assoc Inf Syst

2009;25:25.

44. Farzandipour M, Mohamadian H, Sohrabi N. Intention of continuing to use the hospital information system: Integrating the elaboration-likelihood, social influence and cognitive learning. Electron Physician 2016;8:3385-94.

45. Phichitchaisopa N, Naenna T. Factors affecting the adoption of healthcare information technology. EXCLI J 2013;12:413-36.

46. Kijsanayotin B, Pannarunothai S, Speedie SM. Factors influencing health information technology adoption in Thailand's community health centers: Applying the UTAUT model. Int J Med Inform

2009;78:404-16.

47. Zhou T. Examining location-based services usage from the perspectives of unified theory of acceptance and use of technology and privacy risk. J Electron Commer Res 2012;13:135.

48. Rouibah K, Hamdy HI, Al-Enezi MZ. Effect of management support, training, and user involvement on system usage and satisfaction in Kuwait. Ind Manage Data Syst 2009;109:338-56.

49. Chang IC, Hwang HG, Hung WF, Li YC. Physicians' acceptance of pharmacokinetics-based clinical decision support systems. Expert Syst Appl 2007;33:296-303.