

Factors Determining Nurse Acceptance of Hospital Information Systems in the Medication Process

Hesamaddin Kamalzadeh Takhti ^{a,*}, Azizah Abdul Rahman ^b, Samireh Abedini ^c

^a Hormozgan University of Medical Sciences, Statistics and Information Technology Management, Bandar Abbas, Iran

^b University Teknologi Malaysia, Faculty of Computing, Department of information systems, Skudai, 81310 Johor, Malaysia

^c Hormozgan University of Medical Sciences, Educational Development Centre, Bandar Abbas, Iran

* Corresponding author email address: hesamadin@hums.ac.ir

Abstract

A growing interest in implementing Hospital Information Systems to improve the patient safety and nurses' unwillingness to integrate HIS into their workflow, justifies further research into the factors influencing nurses' acceptance of those systems in the medication process. This study recruited practicing nurses from a Malaysian public hospital. A total of 227 questionnaires were sent, and 186 were returned, for a response rate of 82%. Structural equation modelling using the partial least squares method was utilized to evaluate measurement and structural models. The findings showed that nurses' intention to use an HIS was significantly influenced by two factors: trustworthiness of the information and perceived usefulness. Furthermore, these two factors can be predicted by information quality. Consequently, the model explains 72% of the variance in intention to use an HIS. These findings strongly support the proposed model and highlight the important roles of information quality and trust in predicting nurses' intention to use an HIS in the medication process.

Keywords: Medication errors, Hospital information systems, Patient safety, Nursing

1. Introduction

Patient safety is a critical aspect of hospital management with respect to providing high-quality care. The most common threat to patient safety is medication errors, which has been a topic of concern in recent literature (Callen et al., 2010; Chiang et al., 2010; Fahimi et al., 2009). Introducing a hospital information system (HIS) indirectly provides benefits to the patients (Ahmadi et al., 2015) such as reducing medication errors (Schumacher and Lee, 2008, Lee and Mcelmurry, 2010) which improves patient safety (Koppel et al., 2005; Menke et al., 2001; Ammenwertha et al., 2003). Nurses are the largest group of healthcare providers in the healthcare delivery system (Abedini et al., 2011). They are responsible for administering medication in their everyday practices. However, many nurses seem unwilling to integrate HIS into their workflow (Mohd and Mohamad, 2005; Abdrbo et al., 2011). Although many healthcare institutions have applied an HIS, relatively few studies have investigated the perceptions of nurses regarding the use of an HIS in the medication process. Therefore, understanding nurses' perspectives on HIS in the medication process is obviously important.

1.1 Background of the study

Today, information technology (IT) interventions have great potential for improving the quality of health care (Ahmadi et al., 2015) and reducing the risk of human errors (Marin, 2004; Dünnebeil et al., 2012) because the medication administration process is extremely responsive to advances in medicine and technology (Nelson et al., 2005). In this regard, information systems (IS) have emerged in the health industry as a way to facilitate the patient care process, with the goal of enhancing the quality of care and the safety of individual information (Overhage et al., 2005; Koval, 2005; Mäenpää et al., 2009). Information systems are considered an appropriate approach for better and faster documenting and for retrieving information related to patient medication (Heimar, 2004). Several studies have indicated that the use of an HIS not only improved the quality of care (Lee and Mcelmurry, 2010, Mäenpää et al., 2009) but also improved the medication process, which led to safer care and reduced medical errors (Schumacher and Lee, 2008; Lee and Mcelmurry, 2010). This demonstrates that an HIS has the ability to improve patient safety by reducing medication errors (Koppel et al., 2005; Menke et al., 2001; Ammenwertha et al., 2003) and the risk of human error

(Jen and Chao, 2008). The use of HIS offers nurses more opportunities to consult integrated medical information. As they increase their use of the system in their daily practice, the quality of patient care will inevitably improve. The Technology Acceptance Model (TAM) (Davis, 1989) has been widely tested by many researchers to reveal the factors that may affect users' acceptance of an IS. The TAM received more attention because it has emphasized predicting and explaining user reactions to health IT in particular (Holden and Karsh, 2010). Further, several published studies on the TAM in healthcare (Pai and Huang, 2011a; Yu et al., 2009; Hung et al., 2012; Egea and González, 2011) have explained technology acceptance among care providers by addressing specific types of IS (Aggelidis and Chatzoglou, 2009). Thus, the questions in this research raised as: what is the suitable theoretical

model that can be proposed to predict nurses' intention to use an HIS in the medication process?

1.2 Research model and hypotheses

The study attempts to develop a model based on the major findings from the literature review to explain nurses' acceptance of an HIS in the medication process. Henceforth, two affective variables, information quality (IQ) and trust are adopted and included in the model. The proposed research model assesses the predictive value of: (1) TAM original constructs (i.e., perceived usefulness, perceived ease of use, and intention to use); and (2) trust, perceptions, and information quality. These constructs and their hypothesized relationships are depicted in Fig. 1.

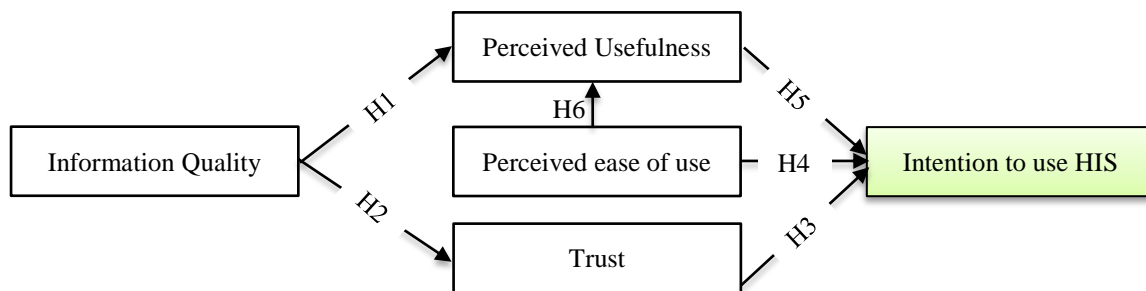


Fig. 1. Research framework

Information quality is an important factor in the IS success model that “measures semantic success”(Delone and Mclean, 2003), and it can be defined as the quality of information that is produced by a system (Kim et al., 2011). The significance of IQ was highlighted and greatly approved in recent empirical studies, and was also found to be closely associated with use of HIS (Ramayah et al., 2010). Thus, when system users consider the IQ satisfactory, their confidence in the system will increase and they are likely to apply the system (Kim et al., 2011). However, the ability of the system to provide correct information is a vital key in building users' confidence. Previous studies have shown that trust is a persuasive aspect of technology (Fogg, 2003). Hence, if nurses find that the HIS system is credible and is able to produce high quality patient medication information, they are more likely to continue using the HIS in the medication process. Based on this, we have derived the following research model and hypotheses:

H1: Information quality of the HIS positively influences its perceived usefulness.

H2: Information quality of the HIS positively influences trust.

H3: Trust positively influences the intention to use an HIS.

H4: Perceived ease of use positively influences the intention to use an HIS.

H5: Perceived usefulness positively influences the intention to use an HIS.

H6: Perceived ease of use positively influences perceived usefulness

2. Method

In this study, conducted in a Malaysian public hospital, a quantitative approach was applied. A questionnaire designed to gather information about the constructs in the research model was employed. The five-point Likert scale was used to measure each construct's indicators. Based on a simplified formula ($n = \frac{N}{1+N(e^2)}$) provided by Yamane (1967), where “n” is the sample size; “N” is the population size, and “e” specifies the desired level of precision ($e = 1$ -precision), 227 full-time practicing nurses were selected using simple random sampling. Data collection was conducted using a cross-sectional survey by means of a self-administered questionnaire.

The evaluation of the measurement model and the structural model was performed by structural equation modeling (SEM), which has been widely applied in healthcare studies (Wu et al., 2011, Melas et al., 2011, Pai and Huang, 2011b, Egea and González, 2011). To evaluate the measurement model and the structural model simultaneously, Partial Least Square (PLS) was performed. Hence, first, a PLS algorithm procedure was performed to assess the quality of the measurement model for reliability and validity (convergent and discriminant) of the constructs (Urbach and Ahlemann, 2010). Then, an evaluation of the structural model was carried out by assessing the coefficient of determination (R^2), which shows the model's ability to explain and predict the dependent latent variables (Ringle et al., 2012) and the significance of path coefficients (Urbach and Ahlemann, 2010, Kijnsanayotina et

al., 2009). To assess the statistical significance of each path coefficient among the latent variables of the research model, the bootstrapping procedure with 500 subsamples (as recommended by Chin (1998)) was performed. Consequently, based on the evaluated structural model, the hypotheses can be considered either confirmed or rejected.

3. Data Analysis and Results

We distributed exactly 227 questionnaires among full-time practicing nurses, who were selected by simple random sampling in various wards of a Malaysian public hospital. Data collection was conducted using a cross-sectional survey by means of a self-administered questionnaire. In total, 186 responses were collected, representing an 82% response rate. To analyze the data, the research model was operationalized and transferred into an SEM and then the PLS approach was applied.

3.1. Sample demographics

The majority of respondents (99.3%) were female. Of the respondents, 64.3% were nurses under the age of 30. Most of the nurses in the sample (97.9%) had a nursing diploma. 53.6% of the respondents had used the HIS for

more than 5 years, while 27.4% had 1 to 3 years of experience with the system.

3.2. Measurement model evaluation

The measurement model was evaluated based on the reliability and validity of the constructs. As presented in Table 1, all constructs returned values of composite reliability and Cronbach's alpha results greater than the acceptable level of 0.70, signifying that the measurement errors were relatively small (Fornell and Larcker, 1981; Kijisanayotina et al., 2009). Moreover, a high loading (> 0.70) of an item on its underlying construct (Table 2) and an average variance extracted (AVE) value above 0.5 for all constructs (Table 1) exhibited reasonable convergent validity of the measurement model with respect to the model's constructs (Fornell and Larcker, 1981). For adequate discriminant validity, the square root of the AVE (the diagonal elements) should be greater than correlations among the constructs (the off-diagonal elements) in the corresponding rows and columns (Table 1). The results demonstrated adequate discriminant validity for all constructs in our research model. Therefore, based on the results of reliability and validity of constructs, the measurement model has been successfully validated.

Table 1

Cronbach's alpha (CA), Composite Reliability (CR), average variance extracted (AVE); diagonal elements are the square root of AVE; off-diagonal elements are correlations between constructs (N = 186).

	CA	CR	AVE	<i>IQ</i>	<i>IN</i>	<i>PEU</i>	<i>PU</i>	<i>T</i>
<i>IQ</i>	0.866	0.903	0.750	0.866				
<i>IN</i>	0.811	0.875	0.837	0.250	0.914			
<i>PEU</i>	0.814	0.877	0.741	0.541	0.348	0.860		
<i>PU</i>	0.890	0.919	0.794	0.404	0.366	0.591	0.891	
<i>T</i>	0.810	0.875	0.838	0.398	0.586	0.429	0.495	0.915

Note: *IQ*= Information Quality, *IN*= Intention to use, *PEU*= Perceived Ease of Use, *PU*= Perceived Usefulness, *T*= Trust

Table 2

Loadings and cross-loadings of individual on their constructs (N = 186).

	<i>NI</i>	<i>IQ</i>	<i>PEU</i>	<i>PU</i>	<i>T</i>
<i>NI1</i>	0.775	0.267	0.263	0.369	0.503
<i>NI2</i>	0.847	0.162	0.218	0.262	0.506
<i>NI3</i>	0.791	0.217	0.356	0.303	0.453
<i>NI4</i>	0.778	0.140	0.278	0.222	0.395
<i>IQ1</i>	0.287	0.796	0.439	0.385	0.319
<i>IQ2</i>	0.180	0.846	0.406	0.335	0.371
<i>IQ3</i>	0.162	0.782	0.425	0.276	0.285
<i>IQ4</i>	0.188	0.865	0.462	0.344	0.391
<i>IQ5</i>	0.182	0.736	0.474	0.270	0.196
<i>PEU1</i>	0.325	0.390	0.843	0.578	0.383
<i>PEU2</i>	0.232	0.397	0.817	0.425	0.348
<i>PEU3</i>	0.176	0.471	0.804	0.434	0.332
<i>PEU4</i>	0.352	0.489	0.733	0.423	0.301
<i>PU1</i>	0.287	0.240	0.430	0.802	0.346
<i>PU2</i>	0.326	0.327	0.469	0.866	0.456
<i>PU3</i>	0.290	0.312	0.477	0.845	0.420
<i>PU4</i>	0.242	0.333	0.450	0.802	0.353
<i>PU5</i>	0.362	0.439	0.603	0.848	0.466
<i>T1</i>	0.518	0.329	0.372	0.419	0.818
<i>T2</i>	0.369	0.303	0.302	0.422	0.821
<i>T3</i>	0.489	0.382	0.384	0.380	0.838
<i>T4</i>	0.475	0.245	0.297	0.364	0.713

Note: *IQ*= Information Quality, *IN*= Intention to use, *PEU*= Perceived Ease of Use, *PU*= Perceived Usefulness, *T*= Trust

3.3. Structural model evaluation

The coefficient of determination (R^2) and the statistical significance of each path coefficient were applied to examine the causal relationship among constructs in the model (Urbach and Ahlemann, 2010; Kijisanayotina et al., 2009). In the current research model, information quality

explains about 56% and 62% of the variance in perceived usefulness and trust, respectively. Consequently, the model explains almost 72% of the variance in intention to use the HIS (Fig. 2). The statistical significance of each path coefficient among the latent variables of the research model are depicted in Fig. 2.

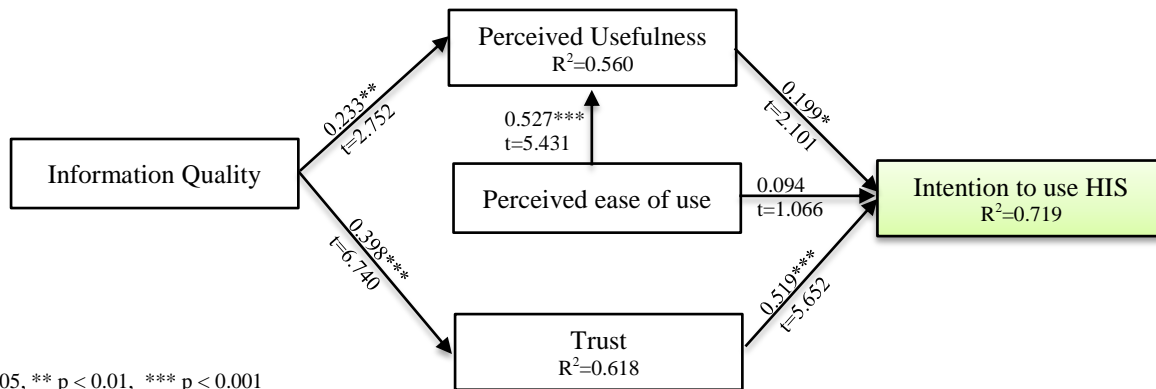


Fig. 2. Results of PLS analysis

4. Discussion

The aim of this study was to evaluate nurses' acceptance of HIS in the medication process. The study results clearly indicated the important role of information quality and trust, which positively influence the intention to use the HIS. The model highlighted the underlying relationships between these two variables and the existing TAM variables, providing insights into how the acceptance and use of an HIS in the medication process can be further facilitated. The results showed that the predictive power of these variables was considerable and represented over half of the variance in the intention to use the HIS ($R^2 = 0.719$), implying that the model could effectively explain nurses' acceptance level of the HIS. The results of the PLS analysis revealed that five of the six hypotheses were supported. These findings significantly extend previous research on user acceptance of technology by connecting the information quality and trust variables to the well-known TAM variables.

The results show that information quality affects not only perceived usefulness, but also trust in the system. The study proves that the information quality of the HIS positively influences nurses' perceptions of its usefulness, with a path coefficient of 0.233 and p -value < 0.01 (supporting H1); and their trust, with a path coefficient of 0.398 and p -value < 0.001 (supporting H2). These results are consistent with previous studies. Pai et al. (Pai and Huang, 2011a) updated the TAM with information quality as the external variable to bring it in line with the context of healthcare information systems, Predicting that users' perception of the usefulness of the system would be affected by the information quality. Moreover, the above analysis suggests that when nurses feel more confident in the information quality of an HIS, its perceived usefulness

will increase. The result is consistent with what Kim et al. (Kim et al., 2011) concluded in their study. As a result, this study asserts that we should emphasize the following: providing relevant and reliable patient information and ensuring on-time updates of information to the system.

The results of the study demonstrated that the intention to use an HIS was significantly influenced by trust, with a path coefficient of 0.519 and p -value < 0.001 (supporting H3); and perceived usefulness, with a path coefficient of 0.199 and p -value < 0.05 (supporting H5). Tung et al. (Tung et al., 2008) extended the technology acceptance model by adding trust as a variable. The results of their studies suggested that trust affects nurses' intention to use an electronic logistics information system, where higher trust results in higher behavioural intention to use. Moreover, the results of this study were also in line with previous studies that proved that perceived usefulness has a great direct positive effect on behavioural intention to use, especially in the field of health care (Tung et al., 2008, Pai and Huang, 2011a). The insignificant effect of perceived ease of use on the intention to use an HIS (H4 was not supported; path coefficient = 0.094 and p -value > 0.05) was not consistent with previous studies (e.g. (Pai and Huang, 2011a, Venkatesh and Davis, 2000, Tung et al., 2008)), while this variable positively affected perceived usefulness, with a path coefficient of 0.527 and p -value < 0.001 (supporting H6). This is in line with the results of the Pai and Huang (Pai and Huang, 2011a) analysis on the factors affecting intention to use healthcare information systems.

5. Conclusions

The investigation of hospital information system acceptance in the process of medication is relatively new to IS and nursing researchers. The results show that the

modified TAM provides a powerful explanation of the intentions of nurses toward using an HIS in the medication process, since the R-square of behaviour intention is 0.719. This implies that the deconstructed TAM may be a robust research model for predicting nurses' intention to use an IS in the context of medication. This study helps hospitals and researchers to understand why nurses resist using an HIS and how improving the systems currently in use may increase their acceptance. Thus, it can be recommended that in order to enhance nurses' acceptance, an HIS should be designed with an emphasis on usability, and should provide reliable and up-to-date information.

Acknowledgements

The authors gratefully acknowledge the nurses who participated in the survey and Dr. Safina Mohammed at Clinical Research Centre for helping the survey process.

References

- Abdrbo, A. A., Hudak, C. A., Anthony, M. K. & Douglas, S. L. 2011. Information Systems Use, Benefits, And Satisfaction Among Ohio Rns. *Computers, Informatics, Nursing*, 29, 59-65.
- Abedini, S., Sihes, A. J. B., Takhti, H. K. & Abedini, S. 2011. Assessing Nursing Curriculum: Graduate Nurse Viewpoints. *Canadian Journal Of Nursing Informatics*, 6.
- Aggelidis, V. P. & Chatzoglou, P. D. 2009. Using A Modified Technology Acceptance Model In Hospitals. *International Journal Of Medical Informatics* 78 115-126.
- Ahmadi, H., Nilashi, M., & Ibrahim, O. (2015). Prioritizing Critical Factors to Successful Adoption of Total Hospital Information System. *Journal of Soft Computing and Decision Support Systems*, 2(4), 6-16.
- Ahmadi, H., Nilashi, M., & Ibrahim, O. (2015). Organizational decision to adopt hospital information system: An empirical investigation in the case of Malaysian public hospitals. *International journal of medical informatics*, 84(3), 166-188.
- Ahmadi, H., Nilashi, M., Ibrahim, O., Ramayah, T., Wong, M. W., Alizadeh, M., ... & Almaee, A. (2015). Exploring Potential Factors in Total Hospital Information System Adoption. *Journal of Soft Computing and Decision Support Systems*, 2(1), 52-59.
- Ahmadi, H., Ibrahim, O., & Nilashi, M. (2015). Investigating a New Framework for Hospital Information System Adoption: A Case on Malaysia. *Journal of Soft Computing and Decision Support Systems*, 2(2), 26-33.
- Ammenwertha, E., Gräberb, S., Herrmann, G., Bürkled, T. & Königb, J. 2003. Evaluation Of Health Information Systems-Problems And Challenges. *International Journal Of Medical Informatics*, 71, 125-135.
- Callen, J., McIntosh, J. & Li, J. 2010. Accuracy Of Medication Documentation In Hospital Discharge Summaries: A Retrospective Analysis Of Medication Transcription Errors In Manual And Electronic Discharge Summaries. *International Journal Of Medical Informatics*, 79, 58-64.
- Chiang, H.-Y., Lin, S.-Y., Hsu, S.-C. & Ma, S.-C. 2010 Factors Determining Hospital Nurses' Failures In Reporting Medication Errors In Taiwan. *Nursing Outlook*, 58, 17-25.
- Chin, W. W. 1998. The Partial Least Squares Approach To Structural Equation Modeling. In: Marcoulides, G. A. (Ed.) *Modern Methods For Business Research*. London: Lawrence Erlbaum.
- Davis, F. D. 1989. Perceived Usefulness, Perceived Ease Of Use, And User Acceptance Of Information Technology. *Mis Quarterly*, 13, 319-340.
- Delone, W. H. & Mclean, E. R. 2003. The Delone And Mclean Model Of Information Systems Success: A Ten-Year Update. *Journal Of Management Information Systems*, 19, 9-30.
- Dünnebeil, S., Sunyaev, A., Blohm, I., Leimeister, J. M. & Kremer, H. 2012. Determinants Of Physicians' Technology Acceptance For E-Health In Ambulatory Care. *International Journal Of Medical Informatics*.
- Egea, J. M. O. & González, M. V. R. 2011. Explaining Physicians' Acceptance Of Ehc Systems: An Extension Of Tam With Trust And Risk Factors. *Computers In Human Behavior*, 27 319-332.
- Fahimi, F., Nazari, M. A., Abrishami, R., Sistanizad, M., Mazidi, T., Faghihi, T., Soltani, R. & Baniyasi, S. 2009. Transcription Errors Observed In A Teaching Hospital. *Arch Iran Med*, 12, 173-175.
- Fogg, B. J. Prominence-Interpretation Theory: Explaining How People Assess Credibility Online. *Human Factors In Computing Systems*, 2003 Florida. 722-723.
- Fornell, C. & Larcker, D. F. 1981. Evaluating Structural Equation Models With Unobservable Variables And Measurement Error. *Marketing Research*, 18 39-50.
- Heimar, M. 2004. Improving Patient Safety With Technology. *International Journal Of Medical Informatics*, 73, 543-546.
- Holden, R. J. & Karsh, B. T. 2010. The Technology Acceptance Model: Its Past And Its Future In Health Care. *Biomedical Informatics*, 43 159-172.
- Hung, S., Ku, Y. & Chien, J. 2012. Understanding Physicians' Acceptance Of The Medline System For Practicing Evidence-Based Medicine: A Decomposed Tpb Model. *International Journal Of Medical Informatics*, 81, 130-142.
- Jen, W.-Y. & Chao, C.-C. 2008. Measuring Mobile Patient Safety Information System Success: An Empirical Study. *International Journal Of Medical Informatics*, 77, 689-697.
- Kijisanayotina, B., Pannarunothai, S. & Speedie, S. M. 2009. Factors Influencing Health Information Technology Adoption In Thailand's Community Health Centers: Applying The Utaut Model. *International Journal Of Medical Informatics* 78, 404-416.
- Kim, J., Hong, S., Min, J. & Lee, H. 2011. Antecedents Of Application Service Continuance: A Synthesis Of Satisfaction And Trust. *Expert Systems With Applications* 38 9530-9542.
- Koppel, R., Metlay, J. P., Cohen, A., Abaluck, B., Localio, A. R., Kimmel, S. E. & Strom, B. L. 2005. Role Of Computerized Physician Order Entry Systems In Facilitating Medication Errors. *Journal Of The American Medical Association*, 293, 1197-203.
- Koval, D. 2005. Real-World Rhio. A Regional Health Information Organization Blazes A Trail In Upstate New York. *American Health Information Management Association*, 76, 44-48.
- Lee, S. & McElmurry, B. 2010. Capturing Nursing Care Workflow Disruptions: Comparison Between Nursing And Physician Workflows. *Computers, Informatics, Nursing* 28, 151-159.
- Mäenpää, T., Suominen, T., Asikainen, P., Maass, M. & Rostila, I. 2009. The Outcomes Of Regional Healthcare Information Systems In Health Care: A Review Of The Research Literature. *International Journal Of Medical Informatics*, 78, 757.
- Marin, H. F. 2004. Improving Patient Safety With Technology. *International Journal Of Medical Informatics*, 73, 543-546.
- Melas, C. D., Zampetakis, L. A., Dimopoulou, A. & Moustakis, M. 2011. Modeling The Acceptance Of Clinical Information Systems Among Hospital Medical Staff: An Extended Tam Model. *Biomedical Informatics*
- Menke, J. A., Broner, C. W., Campbell, D. Y., Mckissick, M. Y. & Edwards-Beckett, J. A. 2001. Computerized Clinical Documentation System In The Pediatric Intensive Care Unit. *Bmc Medical Informatics & Decision Making*, 1.
- Mohd, H. & Mohamad, S. M. S. 2005. Acceptance Model Of Electronic Medical Record. *Advancing Information And Management Studies*, 2, 75-92.
- Nelson, N. C., Evans, R. S., Samore, M. H. & Gardner, R. M. 2005. Detection And Prevention Of Medication Errors Using Real-Time Bedside Nurse Charting. *The American Medical Informatics Association* 12, 390-397.
- Overhage, J. M., Evans, L. & Marchibroda, J. 2005. Communities' readiness For Health Information Exchange: The National Landscape In 2004. *Am Med Inform Assoc*, 12, 107-112.
- Pai, F.-Y. & Huang, K.-I. 2011a. Applying The Technology Acceptance Model To The Introduction Of Healthcare Information Systems. *Technological Forecasting And Social Change*, 78, 650-660.
- Pai, F.-Y. & Huang, K.-I. 2011b. Applying The Technology Acceptance Model To The Introduction Of Healthcare Information Systems. *Technological Forecasting And Social Change*, 78, 650-660.
- Ramayah, T., Ahmad, N. H. & Lo, M.-C. 2010. The Role Of Quality Factors In Intention To Continue Using An E-Learning System In Malaysia. *Procedia Social And Behavioral Sciences*, 2, 5422-5426.

- Ringle, C. M., Sarstedt, M. & Straub, D. W. 2012. A Critical Look At The Use Of PLS-Sem In Mis Quarterly. *Mis Quarterly*, 36, Iii-8.
- Schumacher, K. & Lee, W. Y. 2008. Heterogeneous Quality Information In Healthcare Marketplace. In: Klinger, K. (Ed.) *Healthcare Information Systems*. United States Of America: Information Science Reference.
- Tung, F. C., Chang, S. C. & Chou, C. M. 2008. An Extension Of Trust And Tam Model With Idt In The Adoption Of The Electronic Logistics Information System In His In The Medical Industry. *International Journal Of Medical Informatics* 77 324-335.
- Urbach, N. & Ahlemann, F. 2010. Structural Equation Modeling In Information Systems Research Using Partial Least Squares. *Information Technology Theory And Application*, 11, 5-40.
- Venkatesh, V. & Davis, F. D. 2000. A Theoretical Extension Of The Technology Acceptance Model:Four Longitudinal Field Studies *Management Science*, 46, 186-204.
- Wu, I. L., Li, J. Y. & Fu, C. Y. 2011. The Adoption Of Mobile Healthcare By Hospital's Professionals:An Integrative Perspective. *Decision Support Systems* 51 587-596.
- Yamane, T. 1967. *Statistics, An Introductory Analysis*, New York.
- Yu, P., Li, H. & Gagnon, M.-P. 2009. Health It Acceptance Factors In Long-Term Care Facilities:A Cross-Sectional Survey. *International Journal Of Medical Informatics*, 78, 219-229.