



Framework Based System for Acceptance of Health Information System in Pakistan

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Abstract: The adoption of Information Technology (IT) has remained a point of enthusiasm for the last couple of decades. The Technology Acceptance Models such as TAM are used to predict users' behaviours. Studies on the ability to anticipate people's acceptance with regard to health information system (HIS) are lacking. This study focuses on the "Perceived Ease of USE (PEOU)" and the "Perceived Usefulness (PU)" of the HIS of healthcare professionals in Pakistan. The first step is to examine the level of acceptance and then the willingness to upgrade the HIS for the betterment of the healthcare services in Pakistan among the stakeholders. Consequently, this study used model and proposed that the HIS acceptance is determined by 5 main constructs, namely, "behavioural intention", "attitude, perceived usefulness", "perceived ease of use" and "technology self-efficacy". In this model, "Technology Self-Efficacy (TSE)" had positive and significant effect on "perceived usefulness (PU)" and "Perceived ease of use (PEOU)". "PEOU" has both positive and significant effects on "perceived usefulness (PU)" and attitude. "PU" had positive significant effect on "attitude" and "behavioural intention". "Attitude" had positive and significant effect on "behavioural intention". A questionnaire was designed based on the conceptual model. A seven-factor Likert scale became used during the questionnaire. A survey was then performed after pre-testing the statistics collecting device. valid responses have been coded and analyzed by means of the usage of the Statistical package for the Social Sciences (SPSS) model 21. each descriptive and inferential analyses had been done. The developed version become tested on a pattern of 200 health care specialists of Pakistan.

Keywords: Management Information Systems, Healthcare System, Technology Acceptance Model;

I. INTRODUCTION

The HIS ambitions to make development inside the modern-day gadget of healthcare through the improvement of the workflow in phrases of its reportage. The approaches are intended to ease the fitness care situation conducted underneath the HIS. However, numerous literatures cautioned that sure roadblocks were encountered for the adoption and implementation of health facts systems and technologies, Shefter & Black noted some strengths and weaknesses of the application [1] and [17]. The utilization of innovative and possibly effective eHealth technologies is sweeping the world, but not without public cost. Such implementations require a significant chunk of the national budget. The United Kingdom, for instance, allocated at least £12.8 billion for the "National Programme for Information Technology (NPFIT)" for the "National Health Service". The US under President Barack Obama also made a similar investment, totaling \$38 billion on eHealth for its healthcare program. These countries justify such huge public investments by noting that systems, such as "electronic health records (EHRs)", "picture archiving communication systems

(PACS)", "electronic prescribing (ePrescribing)" and physician, ordering entry systems (CPOE), and computerized "decision support systems (CDSSs)", may be able to help in solving the modern health care issues on quality and safety. These claims, however, consistently used and unquestioned, still needs to be proven true [1].

II. LITERATURE REVIEW

Medical information and health informatics could sometimes become overwhelming. Consequently, more medical practitioners find the utilization of IT applications a necessity. [16] As a matter of fact, more physicians are promoting and implementing ICT applications in their field. This development makes training with regards to Information Technology (IT) and Information System (IS) essential for medical practitioners as these are not usually part of the instructions they learn in the academe [19].

It is crucial within the research area of fitness informatics that a terrific healthy persists in an ICT gadget and medical practices. [4] Previous studies identified the intellectual abilities as well as other skills required from medical

practitioners who will utilize this technology. [2][3] In addition, studies conducted were able to identify the leading ICT professional in the different fields [5] and [9]. The effectiveness of the instruction conducted for HIS operators were likewise investigated. More so, studies showed that in Health Information Technology (HIT) and HIS encompass various information technology applications used in the field of medicine.

Shah and Robinson discovered some key obstructions to physician's contribution in the HIS which are absence of assets, mentality of health awareness work force and absence of understanding of the suitable interdisciplinary learning and aptitudes. On the other hand, physician's association is extremely urgent for the accomplishment of the ICT (Robinson, 2006).

In the field of medicine, information is of utmost importance. Physicians are constantly processing information. Their practice involves the recording, collating, testing, and modifying information. The exact position of medical informatics is at the intersection of information technology, cognitive science, artificial intelligence, and medicine. So, this is not a simple field involving only one aspect such as medical computing, telecommunications, or information engineering, but rather it is a dialogue between physicians, patients, and medical informaticians in medical information systems and online information resources. It explores and develops new knowledge, builds new theories, and organizes principles and solutions. Health information technologies and information systems are to positively increase the outcome of clinical care. Computers, information systems and evidence-based decision makings are vital pillars of health informatics. To take full advantage of all ICT applications in health, physicians have to learn the skills for framing, analyzing and integrating the healthcare information into clinical practices. [23]

The possible solution to the pervading issues in the health care system could be when HIS is fully utilized. Therefore, it is imperative that variables, which may affect technology acceptance is identified. From the literature, there's a significant amount of study conducted to determine the distinction between constant utilization of technology among the physicians and patients. It seems that the physicians adopted the HIS implementation better than the patients. [23]

III. HEALTHCARE IN PAKISTAN

Pakistan have 191.71 million of population with growth rate of 1.91% per year is the 6th most populous country in the world (Ministry of Finance, Gov't of Pakistan, 2015). The population lives in rural cities such as" Karachi and Lahore "have developed, causing major transfers in society and

culture. 3.1%, and 37% is the annual growth rate of urban areas of the total population (Ministry of Finance, Government of Pakistan, 2015). Pakistan has four states, namely "Punjab", "Baluchistan", "Khyber Pakhtunkhwa", "Sindh", and the minor state "Gilgit-Baltistan".

The attention given by the British Government to Pakistan's public health prior to the separation was insufficient. In fact, only government employees were given health care. Prior to the 1970s, local government controlled and monitored the health care system the launch of the "2nd Five Year National Health Plan of 1960 to 1965", "public health planning" was also initiated, covering "Medical Reform Commission", "Family planning program", "Rural Health Centre" Scheme and "Malaria eradication program". The preventive programs of the government that zeroed in on tuberculosis and small pox were made part of 3rd Five Year Plan. In the 4th Five Year Plan for 1970 to 1975, the Infrastructure of the Health Care System was implemented, together with other programs such as expended "Immunization (EPI)" programmes, "malaria and tuberculosis control" programs. The supervision and monitoring of these programs were designated to the "National Institute of Health (NIH)", including "pneumonia and diarrhea control" programs. Health care under "rural development "programs were eventually included in the "6th Five Year Plan". The establishment of basic health care units (BHU), family health care, and rural health centres (RHC), Middle Care Health (MCH) services, and primary health care were significant inclusions in the "7th Five Year Plan (1988 to 1993)". In the "8th Five Year Plan", the "Health Management Information System (HMIS)", "Prime Minister's program for family planning", "social action plan", and "primary health care" were commenced (Nishtar, 2006, Syed Fawad, 2016[18]).

IV. PROPOSED RESEARCH FRAMEWORK

According to the literature on information system research, there is still an insistent problem to select an suitable model from previous information system models, and construction choice on introducing new technologies for adoption [11], [15] [22] [23] To assume the valid elements for better information era adoption, a selection of theoretical models had been incorporated, changed and implemented from various disciplines of social psychology, statistics structures, sociology and business control [11] [15].

In an information system research, TAM is familiar model to study the user acceptance or adoption of different new technologies or information systems. The reason for its acceptance is that "TAM" is parsimonious and able to provide the estimate and clarification about the reputation of extensive variety of facts structures and records era at distinctive expertise levels in conjunction with the cultural

diversity[23][24].

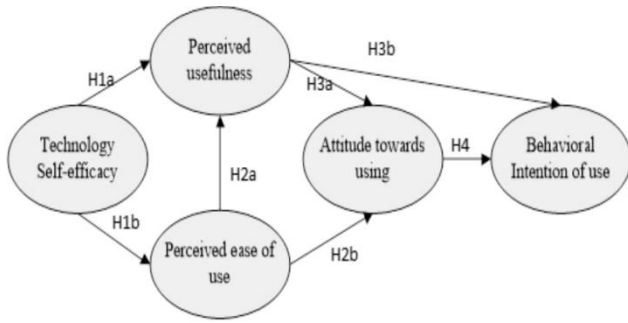


Figure 1 Proposed Model

Figure 1 demonstrates the conceptual framework and hypothesis relationships among various constructs to use for this research. There were three reasons to use “TAM”. (1) “TAM” is a well-researched model with a strong theoretical base and has been established through the use of a set of psychometric size scales. (2) TAM is simple IS parsimonious model and was developed to provide an adequate acceptance with different IS and technologies within diverse contextual settings. (3) “TAM” offers strong empirical aid for its middle constructs i.e. “PEOU”, “PU” in predicting consumer’s popularity of generation. [6], [8] [9] and [25].

The conceptual framework of research shows that “behavioural intention” to accept HIS is jointly determined by “Perceived Usefulness (PU)”, ‘Perceived ease of use (PEOU)”, “Attitude towards using (ATU)” and “Technology self-efficacy (TSE)”. The incorporation of external variable as the antecedents of “PEOU “and “PU” in the proposed model was based on previous studies [6], [8] and [9]). “TSE” has importance to explain the individuals’ behavior towards IT and measure the performance of using IT.

V. RESEARCH METHODOLOGY

This study was carried out to determine the factors that affect the acceptance of health information systems, and to map out the correlations among these elements. Other theories and frameworks in technology acceptance have developed a health information system acceptance. Given its consistency to the topic, this study made use of the quantitative approach to be able to validate hypotheses in the models. Hussey and Hussey [10] in the year 1997 stated that the process of positivistic or quantitative approach is to review the literature and to form a theory and hypotheses.

In the present study, the sample data frame is collected from three major hospitals of Pakistan. The data for this study will be collected from hospitals of Karachi, Lahore and Islamabad where HIS system has been implemented, and the Healthcare professionals of these hospitals has been known how to use

HIS. In this research, the total population is 7680, sample size is 200 and simple random sampling technique will be used as shown in Table 1.

VI. RESULTS

In the survey, the 24 items were required to measure on 7 Likert scale which ranged from “Strongly Disagree” to “Strongly Agree” Table 2 presents the descriptive statistics data the mean rating of 5 constructs between the range of 4.93 (±1.848) and 4.34 (±1.734). The mean value of all items is greater than the point of neutrality (4).

Bivariate Pearson’s correlation was utilized to test the linearity in data. It is a convention that if value is less than 0.05, then the correlation is significant. In Table 3 all the values are less than 0.05 are significant.

As in Table 3 Pearson Correlation values are positive, so all the variables have strong relationship with each other.

Table 1. Descriptive statistics of Constructs

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
B11	200	4.93	1.848	3.416	-.714	.172	-.609	.342
B12	200	4.78	1.865	3.479	-.675	.172	-.707	.342
B13	200	4.86	1.895	3.592	-.653	.172	-.757	.342
B14	200	4.56	1.986	3.946	-.602	.172	-.852	.342
B15	200	4.88	1.765	3.115	-.694	.172	-.537	.342
AT1	200	4.84	1.820	3.311	-.741	.172	-.608	.342
AT2	200	4.72	1.794	3.220	-.651	.172	-.598	.342
AT3	200	4.72	1.751	3.067	-.596	.172	-.699	.342
AT4	200	4.80	1.681	2.824	-.508	.172	-.758	.342
PU1	200	4.80	1.916	3.671	-.786	.172	-.603	.342
PU2	200	4.83	1.785	3.187	-.538	.172	-.923	.342
PU3	200	4.71	1.806	3.262	-.671	.172	-.594	.342
PU4	200	4.68	1.818	3.306	-.430	.172	-.905	.342
PU5	200	4.74	1.861	3.462	-.619	.172	-.811	.342
PU6	200	4.76	1.980	3.922	-.584	.172	-.965	.342
PU7	200	4.27	2.046	4.186	-.139	.172	-1.403	.342
PEOU1	200	4.72	1.830	3.351	-.500	.172	-.890	.342
PEOU2	200	4.81	1.738	3.022	-.514	.172	-.884	.342
PEOU3	200	4.78	1.990	3.961	-.662	.172	-.848	.342
PEOU4	200	4.96	1.729	2.988	-.679	.172	-.542	.342
TSE1	200	4.63	1.847	3.411	-.708	.172	-.685	.342
TSE2	200	4.62	1.767	3.121	-.579	.172	-.728	.342
TSE3	200	4.57	1.914	3.664	-.543	.172	-.928	.342
TSE4	200	4.67	1.783	3.179	-.494	.172	-.799	.342
TSE5	200	4.42	1.849	3.420	-.399	.172	-.962	.342
TSE6	200	4.34	1.734	3.008	-.224	.172	-.946	.342
Valid N (listwise)	200							

Table 2: Pearsons' Bivariate Correlations between latent factors / constructs

		Correlations				
		BI	ATT	PU	PEOU	TSE
BI	Pearson Correlation	1	.261	.614	.457	.555
	Sig. (2-tailed)		.000	.000	.000	.000
ATT	Pearson Correlation	.261	1	.251	.246	.217
	Sig. (2-tailed)	.000		.000	.000	.002
PU	Pearson Correlation	.614	.251	1	.378	.533
	Sig. (2-tailed)	.000	.000		.000	.000
PEOU	Pearson Correlation	.457	.246	.378	1	.401
	Sig. (2-tailed)	.000	.000	.000		.000
TSE	Pearson Correlation	.555	.217	.533	.401	1
	Sig. (2-tailed)	.000	.002	.000	.000	

VII. DISCUSSION

This study looks into the modified TAM model using the healthcare professional's acceptance of health information technology. The data gathered from the healthcare professionals in Pakistan using the TAM was evaluated. The results indicate that the TAM may be considered as adequate and applicable in a professional context as suggested by the fairly reasonable goodness-of-fit indexes for the model. However, the TAM is limited in explaining the attitude and intention in contrast to the ones reported by previous studies which looked into the TAM in a non-professional setting.

In accordance with what the TAM has suggested, PU has been discovered to have a significant influence on the intention of a healthcare professional when it comes to use of the given technology. This indicates that healthcare professionals may be considered as practical individuals who mainly focus on the usability of the technology. It is therefore important that the technology is proven, in order to be accepted by healthcare professionals who perceive technology as tools that can be accepted only when the intended utilities in each of their practices are proven. Providing adequate training is deemed vital in directing the perceptions of healthcare professionals' use of the technology.

Attitude was also discovered to be a significant factor that influences behavioral intention; however, it is lesser in degree compared to the perceived usefulness. This finding indicates the importance of the attitude of a physician in accepting

health information technology. This is in line with its contribution to determine behavioral intention. Since the attitude construct seems positive, it suggests that users are confident to use HIS at their hospitals.

Similarly, "PEOU" was also found to have significant effect on "attitude" and "perceived usefulness". "Perceived usefulness" appeared to be a significant determinant to "attitude" and "behavioral intention" in a model. The users have positive beliefs on "PEOU", therefore they will contribute to acceptance of HIS.

Similarly, "Technology Self-efficacy" has significant effect on "perceived ease of use" and "perceived usefulness". TSE was found to be a more influential determinant of the "perceived ease of use" and "perceived usefulness". These findings suggest that increase in the TSE, accessibility, would increase the PEOU and the PU of the health information system. The IT experts developed the HIS should arrange training sessions and seminars to enhance the TSE and gives confidence to system users.

VIII. CONCLUSION

Previous studies have implied the incompleteness of the TAM. Further studies are encouraged to include literature and other significant constructs to the information systems (IS) acceptance as stated by [12] and [20]. The present research extends the TAM model, and it looks into the effects of the perceived usefulness, perceived ease of use, trust, and technological self-efficacy on the BI towards the acceptance of health information system. Due to this researcher proposed new model.

Studies based on factors affecting users' acceptance of Health Information System by Healthcare Professionals in Pakistan was motivated by the remarkable advancement of technology. This appeared to be one of the foremost compulsions for change in the health sector.

There is very little, or few empirical data presents in a developing economy like Pakistan about the factors that determine the use of the health information system of the health care professionals. The present research is one of the first to use the TAM model in a developing economy like Pakistan. The results of the present research provide new information about health information system in a developing economy.

The study has extended the body of knowledge in IS research related to HIS acceptance in the context of developing country such as Pakistan. This research has examined an integrated model composed of various constructs. This study also fills the gap by contributing the result to determine

healthcare professional's acceptance of HIS in developing countries.

REFERENCES

[1] Black, A. D., Car, J., Pagliari, C., Anandan, C., Cresswell, K., Bokun, T., McKinstry, B., Procter, R., Majeed, A., Sheikh, A. (2011) The Impact of eHealth on the Quality and Safety of Health Care: A Systematic Overview. PLoS Med, 18. Availableonline:<http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1000387> [accessed 11/3/2011].

[2] Bhattacharjee, A.: 'Understanding information systems continuance: an expectation-confirmation model', MIS quarterly, 2001, 25, (3), pp. 351-370.

[3] Brooks, R.G., and Menachemi, N.: 'Physicians' use of email with patients: factors influencing electronic communication and adherence to best practices', J Med Internet Res, 2006, 8, (1), pp. e88-e98

[4] Chilana, P.K., Ko, A.J., Wobbrock, J.O., Grossman, T., and Fitzmaurice, G.: 'Post-deployment usability: a survey of current practices'. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Vancouver, BC, Canada2011 pp. 58-69.

[5] Cooper, J. & Weaver, K. (2003) Gender and Computers: Understanding the Digital Divide, Lawrence Erlbaum Associates, Mahwah, NJ.

[6] Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of information Technology. MIS Quarterly, 13(3), 319-340.

[7] Field, A. (2006), Discovering Statistics Using SPSS, Second Edition edn, SAGE Publications, London.

[8] Fida Chandio, STUDYING ACCEPTANCE OF ONLINE BANKING INFORMATION SYSTEM: A STRUCTURAL EQUATION MODEL, Brunel Business School, Brunel University London, June 2011.

[9] Gefen, D., & Straub, D. W. (2004). Consumer trust in B2C e-commerce and the importance of social presence: experiments in e-products and e-services. Omega, 32(6), 407e424.

[10] Hussey, J. & Hussey, R. (1997) Business Research: A Practical Guide for Undergraduate and Postgraduate Students, Macmillan, London.

[11] Karahanna, E., and Straub, D.W.: 'The psychological origins of perceived usefulness and ease-of-use', Information & Management, 1999, 35, (4), pp. 237-250.

[12] Moon, J.W. & Kim, Y.G. (2001), "Extending the TAM for a World-Wide-Web context", Information & Management, vol. 38, no. 4, pp. 217-230.

[13] Nishtar S. The Gateway Paper--health service delivery outside of the public sector in Pakistan. J Pak Med Assoc. 2006;56(12 Suppl 4): S66-77.

[14] Robinson, S.G.S.a.I.: 'User involvement in healthcare technology development and assessment: Structured literature review', International Journal of Health Care Quality Assurance., 2006, 19, (6), pp. 500-515.

[15] Rogers, E.M.: 'Diffusion of innovations' (Simon and Schuster, 2010.).

[16] Sebastian Garde, D.H., Evelyn Hovenga 'Australian Skill Needs Analysis of Health Informatics Professionals', 'Australian Skill Needs Analysis of Health Informatics Professionals' (Centarl Queensland University, 2005, edn.), pp. 157-180.

[17] Shefter, S. M. (2006). Workflow Technology: The new frontier. How to overcome the barriers and join the future. Lippincott's Case Management, 11, 25-34.

[18] Syed Fawad Mashhadi, Saima Hamid, Rukhsana Roshan, Aisha Fawad, HEALTHCARE IN PAKISTAN--A SYSTEMS PERSPECTIVE, Pak Armed Forces Med J 2016; 66(1):136-42.

[19] Syed Ghulam Sarwar Shah, I.R.: 'Benefits of and barriers to involving users in medical device technology development and evaluation', International Journal of Technology Assessment in Health Care., 2007, 23, (1), pp. 131- 137.

[20] Wang, Y.S., Wang, Y.M., Lin, H.H. & Tang, T.I. (2003), "Determinants of user acceptance of Internet banking: an empirical study", International Journal of Service Industry Management, vol. 14, no. 5, pp. 501-519.

[21] Tago, S. A., Chandio, F. H., Chandio, M. S., Sharif, M., & Abbasi, H. F. N. (2017). Conceptual Framework for understanding Mobile Commerce Applications. University of Sindh Journal of Information and Communication Technology, 1(1).

[22] Moore, G.C., and Benbasat, I.: 'Development of an instrument to measure the perceptions of adopting an information technology innovation', Information systems research, 1991, 2, (3), pp. 192-222.

[23] Imran Anwar Ujan, 2017, ASSESSING THE ACCEPTANCE OF HEALTH INFORMATION SYSTEMS BY HEALTH CARE PROFESSIONALS OF PAKISTAN, International Islamic University, Malaysia, 2017.

[24] Chandio, S., Seman, M. S. A., Samsuri, S., Kanwal, A., & Shah, A. (2018). Assessing ICT Implementation and Acceptance at Public Sector Universities in Pakistan. University of Sindh Journal of Information and Communication Technology, 2(1), 52-56.

[25] Balogun, N. A., Ahlan, A. R., Mejabi, O. V., & Bello, O. W. (2017). Introducing Learner infrastructural capabilities' into information systems success model using e-learning. University of Sindh Journal of Information and Communication Technology, 1(1), 8-16.