HOSPITAL INFORMATION SYSTEM AT LAHORE PAKISTAN

IMRAN ANWAR UJAN[1]*, ALI RAZA[2], MOHAMMED SHADAB KHAN[3], ASADULLAH SHAH [4]

[1,2,3,4]*Kulliyyah of Information and Communication Technology, International Islamic University Malaysia*

[*]*Corresponding author: iujaniium@gmail.com*

Received: 21st February 2020; Accepted: 4th March 2021; Published on-line: 30th April 2021

ABSTRACT: Effective healthcare interoperability is associated with the capability of the service to offer a platform for data distribution between healthcare professionals, process, procedures, and policies. This includes the way the health data of patient are stored and allows healthcare professionals to effectively access and interpret patient's conditions. The survey targeted healthcare professionals in selected hospitals of Lahore Pakistan to investigate factors affecting healthcare professional's adoption of health information systems. The study factors are Behavioural Intention, Usability, Perceived usefulness, Cost Effectiveness, Facilitating Conditions, and Performance Expectancy. Some demographic information is also included.

KEY WORDS: *Health Information System, Technology Acceptance, Technology Use*

1. INTRODUCTION

Health informatics is the management of health resources. Previously, the Information Technology (IT) applications were utilized for regulatory and monetary exercises as opposed to supporting and conveying human services (Audet, Doty, Peugh, Shamasdin, Zapert, and Schoenbaum, 2004). A few cases of ICT utilization in health awareness segment are physician digital assistance, computerized physician order entry, electronic health record, clinical decision support system, picture archiving and communication system, radiology information system, pharmacology information system, health information system, disease early warning system, telemedicine, and health management information system (HMIS) (Harrison et.al, 2007).

Medical informatics is a combination of different fields, like IT, Cognitive Sciences, AI and medicines. The field is not only continuing medical technology, but also a discussion about patient by physicians and medical informatics on health information system. Clinical care benefits increase the development of Information systems and HIS. Vital pillars of health informatics are information systems and evidence-based decision makings. Physicians have learned the skills of technology in their clinics to gain advantages from ICT applications. (Stahl, S.G.P.a.J.E, 1997; David Blumenthal, M.D., M.P.P, 2009).

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

(Robinson, 2006). Consumers using technology positively in health sector should be rewarded, and HIS should be easy to use.

Hospitals are the principle medical care suppliers in non-industrial nations (Clifford, Blaya et al., 2008). Therefore, hospitals should be the essential objective foundations to improve health data frameworks in agricultural nations. Anyway, electronic data frameworks in emergency hospitals in non-industrial nations are "uncommon to nonexistent" (Rotich, Hannan et al., 2003). In a climate where the mindfulness and energy about electronic hospital data frameworks (HIS) does not exist, HIS future is a genuine test (Idowu, Cornford et al., 2008). Despite seemingly insurmountable opposition, if a medical clinic in a non-industrial nation chose to change its data framework and execute a HIS, there would be shockingly inadequate writing on valuable encounters to direct that emergency hospitals through the change. This is on the grounds that writing on "execution" of a medical clinic data frameworks is amazingly restricted (Ovretveit, Scott et al., 2007), and whatever writing is accessible is prevalently from created nations where the conditions, frameworks, cycles, and societies are not quite the same as that of non-industrial nations.

2. LITERATURE REVIEW

Hospital Information System (HIS) is an application which is supported on the web, and its prime goal is to provide improved quality of care to the patients and assist in the administrative services by maintaining and executing the data by electronic means. Its main objective is to manage a workflow which is paperless, meaning it leads to greater reliability of record keeping and extremely easy to use if they have familiarity towards technology, otherwise, they would need a bit of extra training. This eventually is of mutual benefit to the patients and healthcare providers, through which they can extract precise information in time which can lead towards efficient and effective decision making. The health information system has detailed information about the patient, about his/her demographic information, medical history, prior medication, any allergy, past investigations and any specific notes which are related to the patient, for example about past meetings with the doctors and ailments he or she is suffering. All this information is necessary in developing a precise Electronic Medical Record (EMR) for the patient. The stored data can lead to enhanced and truthful analysis of past ailment and give extensive opportunity for research, observing referrals, specific interventions in regard to community related activities and planning for health care. The large data storage for patients can also be used for statistical and futuristic research purposes. These kinds of system can also be implied as the Decision Support Systems for the critical stakeholders in the hospitals to formulate better practices and enhance the existing policies for smoother and streamlined functionality (C-DAC Noida).

The system is moreover modelled to be working around the patient and the medical support staff which entails benefit to either parties, this eventually offers better performance at a lower cost for either two. A lot of abbreviations and names are given to the data based method, which is based on information flow and storage of all the daily records, such as the Hospital information system, Information system for Healthcare, Clinical information system, and Patient Data Management system (PDMS). The information system users are the key to the information system, as they play the pivotal role in the functionality and operability of the hospital information system as the stakeholders.

Ribiere et al. (1999) considered the users of HIS into two categories, i.e. internal stakeholders and external stakeholders. The internal stakeholders comprise the administrative staff, doctors, laboratory technicians, nurses and the support staff which is directly in relation to the information system. Whereas the external stakeholders include everyone who is connected indirectly to the information system for example: suppliers, patients, insurance providers, etc. In this current research we are only considering internal users or stakeholders (V. Ribiere et al, 1999). Prodromos D. et al. (2012) defined the success of their information system based on the measurement of user satisfaction, where system excellence, quality of information and quality of service along with user background were used as the measuring criteria (Prodromos D. at el, 2012).

The exemplary works recording encounters of executing ICT ventures are "Driving Change" (Kotter, 1996) and “Crash” (Collins and Bicknell, 1998). Kotter (1996) recorded the desire to move quickly, form ground-breaking alliance, make a dream, impart the vision, enable others, get ready for momentary successes, solidify upgrades and standardize new methodologies as key variables prompting fruitful usage. Kotter’s, then again, centers around disappointment factors and recognizes over desire, carelessness, over-rated PC innovation, over dependence on ICT experts and ICT advisors, unjustifiable trust in the intensity of the agreement to punish a failing-to-meet expectations of ICT organization, and trust in exorbitantly specially fabricated programming as key components.

From the literature obtained for this investigation, social elements were recognized to be more important than the specialized variables while deciding the achievement of usage. The most widely recognized elements impacting the achievement of HIS execution either directly or indirectly relate to changing the executives, calling attention to the need of formal administrative abilities to deal with the change, the requirement for successful correspondence channels, and the significance of a dream for change (Berg, Aarts et al., 2003; Lorenzi and Riley, 2003; Alvarez, 2004; Kensing, Sigurdardottir et al., 2007; Ovretveit, Scott et al., 2007). Broad forthright arranging (IT, 2007; Edge, Watson et al., 2008), making sure about political help (Cassels, 1995; Alvarez, 2004), and execution from the top (Ovretveit, Scott et al., 2007b) were likewise distinguished as significant achievement factors. Related to these elements was notice of the qualities of pioneers (Berg, Aarts et al., 2003; Lorenzi and Riley, 2003; McGrath, 2006; Frame, Watson et al., 2008). These include advantageous qualities that prompted achievement (for example groundbreaking sort, doctor champion, senior), and hindering attributes that incline a usage to disappointment (for example over submitted and genuinely included pioneer).

3. METHODOLOGY

This study was carried out to determine the factors that affect the acceptance of hospital 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.

The influence in using the quantitative approach is its applicability to the study, given that it is a very useful mechanism in both natural and social sciences. It enables the researcher to establish the reliability and validity of past researches on theoretical schemes and hypotheses – solely dependent on experiments (Patton, 1990; Blumberg, Cooper, and Schindler, 2005). Furthermore, this research method to

explore the relationship between factors and the quantitative approach is highly recommended by Hussey and Hussey (1997).

There are four factors to determine the HIS usage at hospitals in Lahore, Behavioural Intention (BI), Perceived Usefulness (PU), Usability (UB), Facilitating Conditions (FC), and Performance Expectancy (PE). Data collected from different hospitals were analysed based on Demographic studies, Descriptive Analysis and correlation results of variables in SPSS 21.

4. RESULTS

A total of 75 respondents were obtained from three hospitals. Respondents consist of 57 Males and 18 Females; their percentages are 76.0 and 24.0 respectively as shown in Table 1. The highest number of respondents is in the 31-35 years age group, the next highest is 25-30 years and the lowest age group of respondents is 36-40 years; results are shown in Table 2. According to qualifications, respondents with Bachelor are 26, Masters are 36 and MBBS are 13 as shown in Table 3.

Table 1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	57	76.0	76.0	76.0
	Female	18	24.0	24.0	100.0
	Total	75	100.0	100.0	

Table 2: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-30 Years	28	37.3	37.3	37.3
	31-35 Years	30	40.0	40.0	77.3
	36-40 Years	4	5.3	5.3	82.7
	Greater than 40 Years	13	17.3	17.3	100.0
	Total	75	100.0	100.0	

Table 3: Qualification

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Bachelor	26	34.7	34.7	34.7
	Masters	36	48.0	48.0	82.7
	MBBS	13	17.3	17.3	100.0
	Total	75	100.0	100.0	

The Behavioural Intention (BI) construct is defined as "the extent to which an individual intends to adopt or purchase the technology, system or a product in the future" (Venkatesh et al., 2003). Descriptive Statistics results in Table 4 show the responding rate for measuring items. The mean values of BI are between 4.97 (1.80) to 5.81 (1.43).

Table 4: Descriptive Statistics

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
BI1	75	5.5600	1.49087	2.223	-1.288	.277	1.383	.548
BI2	75	5.8133	1.43030	2.046	-1.370	.277	1.590	.548
BI3	74	5.3649	1.31976	1.742	-1.040	.279	1.020	.552
BI4	75	5.6133	1.22908	1.511	-1.503	.277	2.951	.548
BI5	75	4.9733	1.80070	3.243	-.915	.277	-.056	.548
Valid N (listwise)	74							

The respondents' perception of usefulness was measured using 7-point Likert scale from strongly disagree to strongly agree. The mean value of PU is between 5.25 (1.41) to 6.12(5.90). Table 5 shows the mean value is almost greater than 5.0 which is highly rated by health care professionals.

Table 5: Descriptive Statistics

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PU1	75	5.2533	1.41511	2.003	-1.111	.277	1.572	.548
PU2	75	6.1200	5.90684	34.891	7.825	.277	65.629	.548
PU3	75	5.5067	1.43671	2.064	-1.404	.277	2.280	.548
PU4	75	5.4400	1.44484	2.088	-1.672	.277	2.894	.548
PU5	75	5.3333	1.57971	2.495	-1.354	.277	1.603	.548
PU6	75	6.9333	9.96661	99.333	5.758	.277	33.043	.548
PU7	75	5.6933	1.38499	1.918	-1.872	.277	3.808	.548
Valid N (listwise)	75							

There are eight items measured in Usability which are shown in Table 6. The highest mean value is 5.786 (5.88) and the lowest is 5.20 (1.345) which are greater than the natural point 4.

Table 6: Descriptive Statistics

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
UB1	75	5.5200	1.27724	1.631	-.985	.277	1.011	.548
UB2	75	5.7867	5.88928	34.684	8.075	.277	68.353	.548
UB3	75	5.2667	1.40783	1.982	-1.208	.277	1.485	.548
UB4	75	5.0133	1.50219	2.257	-1.055	.277	.640	.548
UB5	75	5.7867	5.90074	34.819	8.025	.277	67.802	.548
UB6	75	5.2533	1.40552	1.975	-1.307	.277	2.009	.548
UB7	75	5.2000	1.34566	1.811	-.991	.277	.753	.548
UB8	75	5.2933	1.27102	1.615	-1.306	.277	1.469	.548
Valid N (listwise)	75							

The respondents' perception on Facilitating Conditions was measured by 6. The mean value of the FC is between 4.81 (0.94) to 5.34(1.09). The result of Table 5 shows the items are highly rated and mean score is greater than 4 which is neutral value, and it was highly rated by health care professionals.

Table 7: Descriptive Statistics

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
FC1	75	5.3200	.91769	.842	-.149	.277	-.532	.548
FC2	75	4.8133	.94000	.884	.085	.277	-.459	.548
FC3	75	4.9333	1.26633	1.604	-.610	.277	.134	.548
FC4	75	5.3467	1.09660	1.203	-.734	.277	2.320	.548
FC5	75	5.0533	1.25087	1.565	-1.337	.277	2.754	.548
FC6	75	4.8133	1.43972	2.073	-1.003	.277	.595	.548
Valid N (listwise)	75							

There were four items measured in Performance Expectancy which are shown in Table 8. The highest mean value is 6.42 (7.11) and the lowest is 5.20 (1.49) which are greater than the natural point 4.

Table 8: Descriptive Statistics

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PE1	75	5.4000	1.55094	2.405	-1.304	.277	1.529	.548
PE2	75	5.4267	1.28582	1.653	-.813	.277	.650	.548
PE3	75	6.4267	7.11332	50.599	8.131	.277	68.984	.548
PE4	75	5.2000	1.49775	2.243	-.798	.277	.566	.548
Valid N (listwise)	75							

The values of the Pearson correlation range from -1 to +1, with a negative number represents a negative correlation (as one variable increases, the other variable decreases) and a positive number represents a positive correlation (as one variable increases, the other also in increases). The closer the value is to -1 to +1, the stronger the association is between the variables.

The test of linearity used Bivariate Pearson's correlation for showing the level of relationships of variables. The significant value of correlation is less than 0.05. Table 9 shows most values are 0.05 and significant.

Table 9: Correlations

		BI	UB	PU	FC	PE
BI	Pearson Correlation	1	.473**	.425**	.627**	.332**
	Sig. (2-tailed)		.000	.000	.000	.004
	N	74	74	74	74	74
UB	Pearson Correlation	.473**	1	.567**	.435**	.297**
	Sig. (2-tailed)	.000		.000	.000	.010
	N	74	75	75	75	75
PU	Pearson Correlation	.425**	.567**	1	.426**	.331**
	Sig. (2-tailed)	.000	.000		.000	.004
	N	74	75	75	75	75
FC	Pearson Correlation	.627**	.435**	.426**	1	.454**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	74	75	75	75	75
PE	Pearson Correlation	.332**	.297**	.331**	.454**	1
	Sig. (2-tailed)	.004	.010	.004	.000	
	N	74	75	75	75	75

**. Correlation is significant at the 0.01 level (2-tailed).

5. CONCLUSION

This research studied the acceptance of Hospital Information Systems by healthcare professionals at Lahore, Punjab, Pakistan. Little data were presented from three different hospitals; the present study used TAM and UTAUT models in developing economy country.

Results show that BI is significant with UB, PU, FC & PE constructs. From the results, researchers concluded that healthcare professionals of Lahore accepted the existing Hospital Information Systems running there.

REFERENCES

Alvarez, A. J. S. (2004). "Challenges to information systems implementation and organisational change management: insights from the health sector in Ecuador." The Electronic Journal of Information Systems in Developing Countries 16(6): 1-16.

Audet AM, Doty MM, Peugh J, Shamasdin J, Zapert K, Schoenbaum S. Information technologies: when will they make it into physicians' black bags? MedGenMed. 2004; 6:2. [PMID: 15775829].

Berg, M., J. Aarts, et al. (2003). "ICT in health care: sociotechnical approaches." Methods of Information in Medicine 42: 297-301.

C-DAC HIS. http://www.cdacnoida.in/cdacnoida/HIS.do. [Online; accessed 20-August-2014].

Clifford, G. D., J. A. Blaya, et al. (2008). "Medical information systems: a foundation for healthcare technologies in developing countries." BioMedical Engineering OnLine 7(18): 1-8.

Collins, T. and D. Bicknell (1998). Crash: learning from the world's worst computer disasters, Simon & Schuster Ltd.

Cooper, D.R. and Schindler, P.S. (2005), Business Research Methods, 7th ed., Irwin/McGraw- Hill, Singapore.

David Blumenthal, M.D., M.P.P, Stimulating the Adoption of Health Information Technology, N Engl J Med 2009; 360:1477-1479

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

Idowu, P., D. Cornford, et al. (2008). "Health informatics deployment in Nigeria." Journal of Health Informatics in Developing Countries, 2, from http://www.jhidc.org/index.php/jhidc/issue/vie w/4.

Kensing, F., H. Sigurdardottir, et al. (2007). "MUST - a participatory method for designing sustainable health IT." Studies in Health Technology & Informatics 129(2): 1204-1208.

Kotter, J. P. (1996). Leading change, Harvard Business School Press.

Lorenzi, N. M. and R. T. Riley (2003). "Organizational issues = change." International Journal of Medical Informatics 69: 197-203.

Ovretveit, J., T. Scott, et al. (2007a). "Implementation of electronic medical records in hospitals: two case studies." Health Policy 84: 181-190.

Ovretveit, J., T. Scott, et al. (2007b). "Improving quality through effective implementation of information technology in healthcare." International Journal for Quality in Health Care 19(5): 259-266.

Prodromos D. Chatzoglou, Leonidas L. Fragidis, Triantafyllia Doumpa, Vasilios Aggelidis,“Hospital Information System Evaluation,” 10th International Conference on Information Communication Technologies in Health, July 2012.

Robinson, S.G.S.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.

Rotich, J. K., T. J. Hannan, et al. (2003). "Installing and implementing a computer-based patient record system in sub-saharan Africa: the Mosoriot medical record system." Journal of the American Medical Informatics Association 10(4): 295.

Stahl, S.G.P. J.E.: ‘Medical informatics: where the action is.’, West J Med, 1997, 166, (2), pp. 82-88.

V. Ribiere, A.J. LaSalle, R. Khorramshahgol and Y. Gousty, “Hospital Information Systems Quality: A Customer Satisfaction Assessment Tool,” 32nd Hawaii International Conference on System Sciences, 1999.