University of Sindh Journal of Information and Communication Technology (USJICT)
Volume 2, Issue 1, January 2018
ISSN-E: 2523-1235, ISSN-P: 2521-5582
Website: http://sujo.usindh.edu.pk/index.php/USJICT/

Assessing ICT Implementation and Acceptance at Public Sector Universities in Pakistan

[1]Shahmurad Chandio, [2]Muhammad Sadry Abu Seman, [3]Suhaila Samsuri, [4]Abida Kanwal, [5]Asadullah Shah

[1345]International Islamic University, Malaysia, department Information system kl, Malaysia
[4]International Islamic University, Malaysia, department of library & Information science kl, Malaysia
[1]shahmurad1@hotmail.com, [2,]msadry@iium.edu.my, [3]suhaila@iium.edu.my,
[4]abidaknawal1@hotmail.com, [5]asadullah@iium.edu.my

Abstract: This paper has assessed the implementation and acceptance of information and communication technology (ICT) at public sector universities in Pakistan. This research was conducted in three major public-sector universities based in one province of Pakistan. A total of 550 questionnaires were distributed and 325 were returned. In addition, three interviews were conducted from the administrative personnel of universities. The research was conducted to assess ICT implementation at universities and its acceptance by academicians. The base for this research was an integrated framework developed for this research called academicians acceptance and use of ICT (AAU-ICT). This framework was developed using; Unified theory of acceptance and use of technology (UTAUT) with an additional four constructs Culture, external incentives, perceived needs and job relevance**.** In order to make the results strong, a mixed method approach was adopted by incorporating both quantitative and qualitative methods. The results demonstrate that ICT is being implemented at universities, yet it has issues of equipment availability and proper environment, while academicians' acceptance of ICT is more contingent on to their field of teaching than the need of ICT in profession.

Keywords: ICT implementations, AAU-ICT Framework, academicians, universities, Pakistan;

I. INTRODUCTION

In the 21st century, information and communication technology has changed the traditional ways of living and work environments. Thus, the digital era, has brought every sector of life on ways and mediums provided by technology. Hence, education system around the globe have integrated ICT system, from primary to upper levels. In actual fact the developed world has completely transferred its education through the use of technology, while developing nations are in the implementation phase. The state of any education system is determined by the quality of its higher education system (HES), because the HES contributes to the development of education at all levels[1]. In addition, UNESCO considers that "ICTs can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development as well as improve education management, governance and administration". Hence, universities are the actual source of providing higher education. Therefore, this study has been carried out to evaluate implementation and acceptance of ICT at public sector universities of Pakistan.

Pakistan being a developing nations, always had a vision to bring improvements in every sector of life and to be like developed nations, meanwhile government have always proposed plans to advance and adopt technology in every sector, by realizing the higher education being the most important base to be used for main human resource who can face new challenges of this ICT era, thus, ICT degree education was started in decade early 90's while universities were provided with computers and internet, since then ICT implementation at universities remain continue and several advance project were also announce and adopted like high speed Internet, sophisticated computer labs, ICT equipment's including computers and video conference rooms at each university as well as digital library access. Surprisingly, all these efforts for ICT adoption have not be so successful, with most university environments still fixated with manual work environments. Classes are still not digitized, there is no central record management system and libraries are still manually catalogued. According to [2] various educational policies has been made but none accomplished successfully. Moreover, the faculty members especially those in other than ICT related subjects, are still striving to accept ICT in their academic work. Pakistan is trying to make its universities more like the modernized and high-class universities of the developed world. Efforts still are needed to be on a par with international standards, not only in implementation but also ICT utilization. Hence, few studies have been conducted, but still no comprehensive research focusing on the implementation level and finding out critical factor for the successful use of ICT has been carried out. Therefore, this research was carried out to know the implementation level at different universities, while sorting out the factors that could have an impact on academic staff for acceptance of ICT in their academic work.

.

II. RESEARCH OBJECTIVES

a) To know the ICT implantation at public sector universities.
b) To know the acceptance and use of ICT at public sector Universities.
c) To know the hindrances in successful adoption of ICT.
d) To know the critical success factors in the acceptance and usage of ICT.

.

III. LITERATURE BACKGROUND

Technology implementation, adoption acceptance and usability have been discussion of many researchers for many decades. in the span of time, many theories and models have been developed for assessing the acceptance of information and communication technology. Now it has become perceptible that the key factor in success of any innovation is education system and academicians. Hence, numerous studies have been conducted worldwide on technology acceptance. The literature shows that the, Theory of reasoned action (TRA), Theory of Planned behavior (TPB), Technology Acceptance Model (TAM), and one of the latest theory, the Unified Theory of Acceptance and Use of Technology (UTAUT) are also used to assess ICT adoption in educational institutions and ICT acceptance and use by academicians. The UTAUT was originally proposed [3], where all previously established eight models were combined and a comprehensive theory was developed. Now the theory UTAUT is considered the most dominant in information system field [4]. This research was also carried out based on UTAUT, along with additional factors that includes culture, external incentives, perceived needs and job relevance. These factors are added due to different contexts and approaches for this research.
The Literature in context of the ICT adoption clearly shows the gap between the developed countries and developing nations [5]. In a [6] describes that despite of vast impact of ICT, the inequitable to access it, still remains the major issue. The different studies show that every country has its own culture and the studies demonstrates that that national culture does influence the ICT adoption in different nations [7]. In addition, it provides to new environment in an organizations [8]. The ICT in higher education brings quality and provides modern approach to communicate and process. Nowadays, it is considered too of collaborative learning [9]. Furthermore, ICT provides the most influential way to internationalize higher education. Hence, Pakistan too need to internationalize ICT curriculum and approach to utilize ICT [10]. However, Pakistan introduced ICT in its higher education institutes in early 90's, since than many projects has been initiated, almost basic infrastructure is available at every HEIs [11] but the studies shows that despite of various efforts there is low usage of ICT, no upgradation in infrastructure and lack of maintenance [11], [12]. According to the global information technology report 2016 by world economic forum Pakistan is ranked at 110th position of out of 143 countries in networked readiness index [13],while latest report about in the ICT readiness index shows Pakistan position at the 111th [14]. The ICT infrastructure and readiness in generally become a challenge for developing countries like Pakistan [14] Therefore, this research was carried out in education perspective with focus on public sector universities in province, of Sindh, Pakistan. The approach used to assess ICT implementation and acceptance in universities used a framework developed on comprehensive review of literature, based on latest theory UTAUT [15] and some additional factors. The framework is discussed and given in next section.

IV. FRAMEWORK USED FOR THIS RESEARCH

The framework used for this research is developed using UTAUT model along with some additional constructs called Information and Communication technology academicians acceptance (AAU-ICT) [16].

.

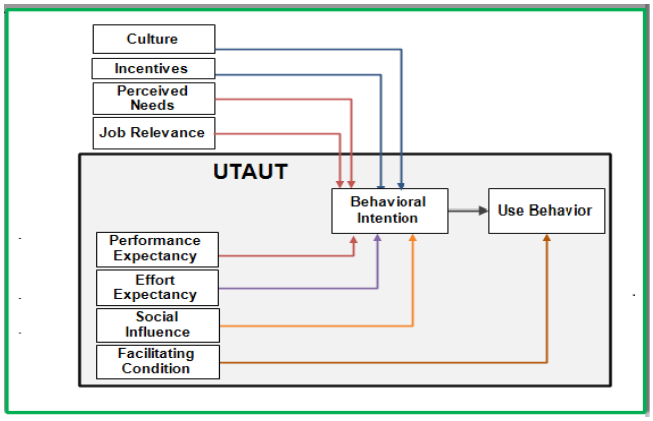

Figure 1. Framework AAU-ICT

The root constructs and additional constructs used in the framework are defined below.

BI- level to which an individual intends to perform a specific behaviour [3]
Use Behavior- The actual behavior of user measured through frequency of use [3]
Culture- the impact of prevailing practices on an individual [17]. Culture was measured through the factors stated in [18], consisting Power Distance, Individualism / Collectivism, Uncertainty Avoidance, Masculine / Feminine
EI- impetus to incite an action in an individual [19]
PN- Level of Improvement in performance [20]
JR- The application of intended system in an individual's Job [21].
PE - is the extent to which an individual believes the system will help them do their jobs better [3]
EE - related to how easy an individual believes the system is to use [3].
SI – Individual's intention to use the system by inspiring others [3].
FC - Organization resources available to individuals to use the system[3].

V. RESEARCH METHODOLOGY

This research utilized both approaches i.e. quantitative and qualitative by adopting an explanatory research strategy [22]. Data collection was achieved using the survey method for a quantitative approach based on stratified sampling technique and face to face interview method based on expert sampling for both quantitative and qualitative approaches, respectively [23]. A total of 500 questionnaires were distributed among the faculty in the first phase of this research consisting of a survey questionnaire based on quantitative research. The qualitative part comprised of interviews was conducted from three different experts working in different public-sector universities. These Interviewee were selected based on expert sampling technique.

VI. RESULTS

The Results achieved based on analysis are described according to the objective of the research

Object 1. To know the ICT implantation at public sector universities

In order to achieve this objective, part two of the survey instrument was provided with items, to know the facts and figures about ICT availability at the universities. That part was comprised of queries about the implementation of ICT or facts about ICT availability at the universities. This object examined the extent to which the ICT infrastructure is in practice at various public-sector universities. The table 1 shows the details of ICT implementation at public sector universities. It is this revealed that the basic infrastructure tools are already available but not equally distributed among various departments nor equally provided, yet awareness seems to be an issue due to a lack of training facilities. While the Internet is the major service provided, all other supporting and modernized equipment for ICT are more or less not available in to 50% of departments, in addition ICT is being used individually but no integrated campus management system is implemented, which is compulsory to modernize the working environment. Moreover, classes are not digitized yet as there is 49% response for the availability of Multimedia projects at different departments, even though software availability is only availed by 27%., while Wi-Fi is only availed by 25.53%.

Table 1: General Implementation of ICT

Variable	Items	Frequency	Percentage
Availability of ICT equipment	Internet	312	96 %
	Computer labs	186	57%
	Software	89	27 %
	Digital library access	165	51%
	Video Conference System	75	23 %
	Multimedia System	159	49%
	Campus Management Information System	4	1.2%
	Wi-Fi	83	25.53 %

Object 2. To know the acceptance and use of ICT by academicians at public sector Universities

The second objective was achieved by exploring the response from the academicians as shown in table 2. That explained that there is acceptance and usage of ICT, although not in ideal position, yet much more effort is needed to put ICT at the top, as is the case in modern world universities. The results show that the usage of available resources by academicians is up to 62% while 38% of respondents said they use ICT resources at a low level. In addition, the level of Computer acquaintance demonstrates that most of the respondents are average with 73% percent, while there are also people with very basic knowledge of ICT comprising 7%. In addition, the percentage of respondents at advanced and expert levels is 20%, This data shows that, there is high acceptance of ICT by academicians at universities, while a shortage of resources may be a hindrance in using the available resources.

Table 2: Acceptance and use of ICT

	Attribute	Response rate	Percentage
Usage of ICT facilities available	All available resources	77	23.69. %
	Most of the available resources	124	38.2%
	Few of the available resources	83	25.5%
	Very few of the available resources	41	12.6%
Level of Computer literacy	Basic	22	6.8%
	Average	238	73.2%
	Advance	50	15.4%
	Expert	15	4.6%

Object 3. To know the hindrances in successful adoption of ICT

This objective was achieved by knowing the characteristics that can act as hindrances or impediments to success in ICT. The data given in table 3, demonstrates that equipment availability is the major hindrance in the successful adoption of ICT, as it, was notified by 49% of the respondents that there is a lack of equipment. while other hindrance were provision of trainings and technical support with percentages of 24% and 11%. In addition, there were other issues mentioned such as environment 6%, cost 4%, time 5% and interest 1%.

Table 3: Hindrances in ICT adoption

Attribute	Response rate	Percentage
Equipment availability	158	48.6%
Training	78	24.0%
Time	15	4.6%
Interest	5	1.5%
Technical support	37	11.4%
Environment	19	5.8%
Cost	13	4.0%

Object 4. To Confirm the critical successful factors in acceptance and usage of ICT

The Factors stated in framework given in Fig 1, were statistically measured per the scale used in the instrument. The reliability analysis results yield the results that factors are important to be retained in model. Therefore, based on the acceptable range of results for reliability this shows that these factors have somehow influence on behavioral intention of individual towards use of ICT, the reliability results are stated in table 4.

Table 4: Reliability Analysis

S. No	Constructs	Reliability
1	Behavioral Intention	.952
2	Use Behavior	.902
3	Power Distance	.942
4	Individualism/Collectivism	.825
5	Uncertainty Avoidance	.906
6	Masculine / Feminine	.928
7	External Incentives	.902
8	Perceived Needs	.801
9	Job Relevance	.741
10	Performance Expectancy	.933
11	Effort Expectancy	.965
12	Social Influence	.889
13	Facilitating Conditions	.820

Furthermore, the factor extraction was also conducted to determines the smallest number of factors used to represent the best interrelationship among the set of variables by adopting Kaiser ‘s criterion and using the Principal component analysis method from SPSS. According to Kaiser’s Criterion or the eigenvalue rule, only factors with eigenvalue of 1.0 or more are retained for further investigation [24] relatively the same factors which were found acceptable in the reliability test generated results of an eigenvalue >1. this credence to strength to research that the factors are important. Meanwhile, the total variance explained by the first factor was found to be 23.564, while the remaining variance in the model was explained by 13 other factors.

it was thus confirmed that the factors are critical to be considered for successful acceptance of ICT systems by their users especially academicians.

VII. DISCUSSIONS

The results show that the implementation of ICT at universities is at the middle phase. The ICT systems are incorporated but despite three decades of implementation, all ICT related equipment’s, services and applications are provided in average, hence use age of them is of average level. Meanwhile, Integrated system is not implemented, the universities sampled in this research don’t us even campus management system. In can be said that, there is lack of ICT environment in universities, things are parallel with manual physical and computerized approaches. Moreover, the ICT acceptance and use by academicians is also different in different departments. ICT relevant departments are more efficient in acceptance while others need motivation programs and facilities to use it. In addition, there are enormous hindrances, such as lack of equipment and trainings and way of communication by management, alongwith technical help. Furthermore, the results for the objective four have been supportive to the proposed factors. Therefore, it can be assumed that this research has identified critical successful factors to be looked in to for the proper success of ICT implementation as well as acceptance by academicians.

VIII. CONCLUSION

This research paper has focused on ICT implementation in universities and its acceptance by academicians in universities in Pakistan. The results show that ICT is being implemented, but there is still a lack of proper infrastructure, equipment, training and environment. The other side of the research pertaining to academicians revealed that academicians consider ICT a useful tool to be used for quality education, meantime lack of resources, awareness, trainings and environment are challenges for its effectiveness. In addition, this research contributed by exploring success factors for ICT acceptance and usage by academicians, which lead to reveal academician’s acceptance and use of ICT framework. Furthermore, this research finding provides ICT status and potential implications for improving ICT infrastructure and teaching standards. Especially, factor like incentives and facilitating conditions could be the most important ones to successful adoption of ICT by academicians, while training and awareness programs can stimulate the perceived need to use ICT and raise the awareness of ICT’s potential benefits. In return academicians can motivate themselves for performance expectancy and effort expectancy regardless of field relevance. Whereas focusing on ICT acceptance by academicians can enhance culture factors could be effectiveness to bring ICT based working culture in universities, of developing country like Pakistan. Importantly this research validated the four principal factors of the UTAUT model in the context of a developing country’s educational system. Finally, the findings of this research are beneficial to both the university staff, top management, higher

education commission, ICT policy makers and government of Pakistan. Especial recommendations based on finding are all academicians working in universities regardless of their field of specialization should be provided with mandatory training on ICT potential benefits and its proper utilization for academic excellence. Universities should be integrated with campus management information system and top management should especially concentrate on communication through online resources, which would bring all staff on ICT based services and will be motivated to use ICT effectively. Finally, the government should increase its budget for universities, so, that they could adopt modern technology as per their requirements.

IX. FUTURE WORK

This research scope was limited to one province in Pakistan. Therefore, further research is needed from all provinces of Pakistan, to achieve comprehensive view of ICT implementation and acceptance at higher educational institutes of Pakistan. In addition, this paper has focused on facts about ICT implementation in target universities while basic statistics was performed to know the validation of proposed constructs in Framework. Though the results strongly support the determinants in both quantitative and qualitative results, that too achieved the objectives of this paper, Meanwhile, an advance statistics like structural Equation modeling (SEM) and hypothesis testing will be performed in future.

REFERENCES

[1] M. W. Nisar and S. A. Munir Ehsan Ullah Shad, "Usage and Impact of ICT in Education Sector ; A Study of Pakistan," Aust. J. Basic Appl. Sci., vol. 5, no. 12, pp. 578–583, 2011.

[2] W. Abbas, M. Ahmed, R. Khalid, and T. Yasmeen, "Analyzing the factors that can limit the acceptability to introduce new specializations in higher education institutions: A case study of higher education institutions of Southern Punjab, Pakistan," *Int. J. Educ. Manag.*, vol. 31, no. 4, pp. 530–539, 2017.

[3] Viswanath Venkatesh et.al, "User acceptance of information technology: Toward a unified view," *MIS Q.*, vol. 27, no. 3, pp. 425–478, 2003..

[4] M. D. Williams, N. P. Rana, and Y. K. Dwivedi, "The unified theory of acceptance and use of technology (UTAUT): a literature review," J. Enterp. Inf. Manag., vol. 28, no. 3, pp. 443–488, 2015.

[5] S. Kyakulumbye, M. Olobo, and V. Kisenyi, "Information Communication Technology (ICT) Utilization in Private Universities in Uganda : Exploring Strategies to Improve . A Case of Uganda Christian University," vol. 2013, no. February, pp. 22–29, 2013.

[6] B. Swar and G. F. Khan, "Mapping ICT knowledge infrastructure in South Asia," *Scientometrics*, vol. 99, no. 1, pp. 117–137, 2014.

[7] A. A. Erumban and S. B. de Jong, "Cross-country differences in ICT adoption: A consequence of Culture?," *J. World Bus.*, vol. 41, no. 4, pp. 302–314, 2006.

[8] S. Majumdar, "Emerging Trends in ICT for Education & Training," *Dir. Gen. Asia Pacific Reg. IVETA*, 2002.

[9] N. Duță and O. Martínez-Rivera, "Between Theory and Practice: The Importance of ICT in Higher Education as a Tool for Collaborative Learning," *Procedia - Soc. Behav. Sci.*, vol. 180, no. November 2014, pp. 1466–1473, 2015.

[10] A. Saleem and K. Higuchi, "Globalization and ICT innovation policy: Absorption capacity in developing countries," *Int. Conf. Adv. Commun. Technol. ICACT*, pp. 409–417, 2014.

[11] Z. A. Shaikh, "Role of ICT In Shaping the future of Pakistani Higher Education System," *Turkish Online J. Educ. Technol. 10(1), 149-161.*, vol. 10, no. 1, pp. 149–161, 2011.

[12] M. Bakhsh, A. Mahmood, and N. A. Sangi, "An assessment of students' readiness towards mobile learning at AIOU, Pakistan," *2015 Int. Conf. Inf. Commun. Technol. ICICT 2015*, 2016.

[13] World Economic Forum, *The Global Information Technology Report 2016 Innovating in the Digital Economy*. 2016.

[14] Klaus Schwab, "The Global Competitiveness Report," World Economic Forum, 2017.

[15] Y. K. Dwivedi, N. P. Rana, A. Jeyaraj, M. Clement, and M. D. Williams, "Re-examining the Unified Theory of Acceptance and Use of Technology (UTAUT): Towards a Revised Theoretical Model," *Inf. Syst. Front.*, pp. 1–16, 2017.

[16] S. Chandio, M. Sadry, S. Samsuri, and A. Shah, "Acceptance and Use of Information and Communication Technology by Academicians : Towards A Conceptual," 2016.

[17] A.Zakour, "Cultural differences and information technology acceptance," in *... Conference of the Southern Association for Information ...*, 2004, pp. 156–161.

[18] G. Hofstede, Culture's consequences: International differences in work-related values. Sage, Beverly Hills, 1980.

[19] E. A. Locke, "Toward a theory of task motivation and incentives," Organ. Behav. Hum. Perform., vol. 3, no. 2, pp. 157–189, 1968.

[20] W. Fatimah, W. Ahmad, A. G. Downe, and T. T. Lai, "Determinants of Computer Usage among Educators," in Institute of Electrical and Electronics Engineers, Universiti Teknologi PETRONAS, NPC, & National Postgraduate Conference. (2011). 2011 National Postgraduate Conference: (NPC) ; 19 - 20 Sept. 2011, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, Tron, 2011, no. 2.

[21] V. Venkatesh, "Technology Acceptance Model 3 and a Research Agenda on Interventions," vol. 39, no. 2, pp. 273–315, 2008.

[22] S. Uma and B. Roger, Research Methods for Bussiness, 6th ed. Wiley, 2014.

[23] J. W. Creswell, Research Design Qualitative, Quantitative, and Mixed Approaches. 2009.

[24] P. Dunn, "SPSS survival manual: a step by step guide to data analysis using IBM SPSS," Aust. New Zeal. J. Public Heal., vol. 37, no. 6, pp. 597–598, 2013.