GLOSERV

ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT

Editors

Dr. Cihan Cobanoglu

Dr. Valentina Della Corte

Co-Editors

Dr. Cihan Cobanoglu, University of South Florida, USA
Dr. Valentina Della Corte**,** University of Naples Federico II, Italy

ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT: VOLUME 2

ISBN 978-1-955833-03-5

****Authors are fully responsible for corrections of any typographical, copyrighted materials, technical and content errors.***

https://digitalcommons.usf.edu/m3publishing/vol5/iss2021/102
DOI: https://www.doi.org/10.5038/9781955833035

Co-Editors

Dr. Cihan Cobanoglu, University of South Florida, USA
Dr. Valentina Della Corte**,** University of Naples Federico II, Italy

ISBN 978-1-955833-03-5

This imprint is published by USF M3 Publishing, LLC

The registered company address is University of South Florida, 8350 N Tamiami Tr, Sarasota, FL 34243 USA.

****Authors are fully responsible for corrections of any typographical, copyrighted materials, technical and content errors.***

https://digitalcommons.usf.edu/m3publishing/vol5/iss2021/102
DOI: https://www.doi.org/10.5038/9781955833035

Understanding Information Technology Acceptance by Physicians: Testing Technology Acceptance Model

Anuruddha Indika Jagoda

Ministry of Health Colombo, Sri Lanka

Abstract

Information and communication technologies (ICT) have revolutionized modern organizations by assisting them to increase operational effectiveness and efficiency. The knowledge-based companies can benefit enormously by deploying ICT. However, healthcare organizations such as hospitals are lagging in adopting ICT. This is particularly true for the developing countries where managers faced both financial and social obstacles in implementing such technologies. This paper provides experience implanting information technology systems in a major hospital in Sri Lanka: a developing country. By using technology acceptance model as a framework, it aims to investigate critical factors influencing physicians' intention and their acceptance of information technology. The results shows that lack of understanding of the benefits was the main cause of cause of physician's hesitancy to embrace information technology tools.

Keywords: information and communication technologies, technology acceptance model, Sri Lanka

***Recommended Citation*:** Jagoda, A. I. (2021). Understanding information technology acceptance by physicians: Testing technology acceptance model. In C. Cobanoglu, & V. Della Corte (Eds.), *Advances in global services and retail management* (pp. 1–9). USF M3 Publishing. https://www.doi.org/10.5038/9781955833035

Introduction

The rapid development of information technology applications is considered to as key aspect in enhancing effectiveness and efficiency in healthcare operations. Recent development in data sciences and information management like artificial intelligence, big data and design thinking has aided organizations developing groundbreaking solutions to complex needs of the healthcare industry. The paradigm shift of recording and managing information from manual processes to computerized systems helped the healthcare organizations to alter their way of learning and decision making (Ahmad, et al. 2020). The effectiveness of health information technology is predominantly depending on end user's acceptance and use in healthcare operations. In this context, understanding of end user's perceptions, acceptance, and potential ability to use is important precedent for selecting and implementing information technology applications in healthcare organizations.

Healthcare is a knowledge intensive industry and information technologies can create competitive advantage for organizations. The hospitals as the forefront avenue of delivering healthcare for people, has been influx of information technology tools and applications. The most common information technologies used in hospitals include Hospital Information Technology (HIT), Electronic Patient Record (EMR), Clinical Decision Support (CDS), e-Health and RFID

technology, and Computerized Physician Order Entry (CPOE) systems (Sıcakyüz and Yüregir, 2020). These information systems provide many benefits to the hospitals, implantation of such systems is not easy task as many systems failed to achieve desired objectives. While acceptance, perception, and implementation of information systems in a hospital setting is widely studied in developed country setting, there are limited studies investigating factors influencing user acceptance of information technology in a developing country setting. Using Technology Acceptance Model is used a framework, this research attempts to factors influencing physicians' intention and their acceptance of information technology. The remainder of the paper is structed as follows: first, literature review of TAM and use if IT in healthcare industry is presented. Second, a brief description of country and hospital setting is provided. Third, methodology and data collection are outlined. Fourth, data analysis and results are presented. Last, conclusions are policy implication are outlined.

These systems have the potential to improve the health of individuals by providing improved quality and minimizing cost. For example, EMR systems allow processes such as displaying, editing, and recording patient graphs on the computer. These systems provide quick access to patient information by providing a digital information area for physician notes (Walter & Lopez, 2008) and facilitate administrative work by providing e-mail access; control through the internet and clinical decision support (Van Slyke et al., 2007).

In modern healthcare systems, health information systems (HIS) is one of the most valuable possessions of a hospital. Research shows that the use of health information systems such as electronic medical record (EMR) and computerized physician order entry (CPOE) systems enhance patient safety, quality, and reduce costs.

Literature Review

The technology acceptance model (TAM), originally proposed by Davis (1989), is the most widely used model for predicting and explaining use acceptance of information systems. It outlines two major factors: perceived usefulness and perceived ease of use influencing user acceptance. Researchers have used TAM to analyze the technology acceptance in the healthcare industry focusing on technology aspects (Wu et al. 2011) and external factors (Yarbrough and Smith, 2007).

Technology Acceptance Model (TAM)

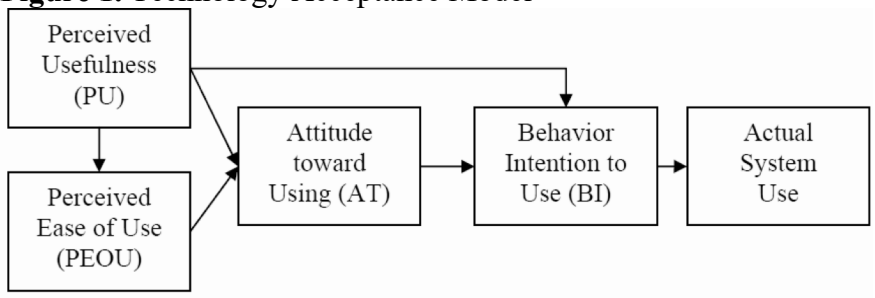
Successful implementation of any HIS depends mainly on the acceptance of it by health staff. One of the challenging issues health managers face is that of identifying factors that cause people to accept and make use of systems developed and implemented by others. Over the decades, various theories and approaches have been put forth to address this problem2.To predict the acceptance of ICT based solutions in work setting Technology acceptance model suggested by Davis (1989) which is based on the causal relationship of the theory of reasoned action. TAM has been applied in various contexts and has received empirical support from numerous studies4.Prior research studies also indicates that the TAM is suitable for using modeling tools for predictions, attitudes, satisfaction, and usage based on beliefs and external variables. Davis (1989) proposed the TAM that identified perceived usefulness (PU) and perceived ease of use (PEOU) as the two salient beliefs that determine people’s attitude toward accepting a technology.

https://digitalcommons.usf.edu/m3publishing/vol5/iss2021/102
DOI: https://www.doi.org/10.5038/9781955833035

In TAM, perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." It defines the word useful as "capable of being used advantageously." A system high in perceived usefulness, in turn, is one for which a user believes in the existence of a positive use-performance relationship (Davis, 1989).

Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort." This follows from the definition of "ease": "freedom from difficulty or great effort. "Effort is a finite resource that a person may allocate to the various activities for which he or she is responsible5. All else being equal, we claim, an application perceived to be easier to use than another is more likely to be accepted by users (Davis 1989). The model is shown in figure 1.

Figure 1. Technology Acceptance Model



Source. Adopted from Davis (1989)

Perceived Usefulness, Behavior Intention and Perceived Ease of Use

Perceived usefulness can be defined as the extent to which a user believes that using a technology would enhance their performance. Behavior Intention (BI) is the strength of a person's 's intention to use the technology. The TAM carries the basic idea that internal beliefs will influence "attitude", which will further influence the intention for usage. Studies have shown that the intention for usage has a significant and positive impact on the actual use of the system. In a study by Szajna et al (1996), they removed the variable of user's "attitude" from the original TAM and revised the model to conclude that the intention to use is strong enough to influence technology acceptance. Perceived Ease of Use (PEOU) is the extent to which a user believes that using the technology would be free of effort. It has been shown that the greatest contribution of the TAM lies in the introduction of two perceived beliefs, (perceived ease of use and perceived usefulness) that influence the users' technology acceptance.

Perceived Threat

Perceived Threat (PT) can be defined as the extent to which a person believes that using the technology would decrease their control over the conditions, processes, procedures, or content of their care work. Literature shows that healthcare workers resistance to the introduction of information technology is common, and that the primary issue is the collection of information can be threatening individually, as the potential for peer review or performance review by managers is obvious. As a result, they may express a low intention to use the technology.

Methods

Empirical Model

Health Information System in Emergency Department

Emergency department generates vast amount of data in terms of medical history, clinical condition, treatment, and laboratory investigations. The need for implementation of electronic hospital management information system emerged to capture and organize the information and leverage the competencies and benefits of information and communication technology to transfer health care delivery.

Electronic Health Information Systems in Sri Lankan Hospitals

Sri Lanka is well known for its better health indices when compared with other countries. This is mainly due to strong curative and preventive health system. Health / Medical records and timely and accurate statistics are of a paramount importance in a good health system. Traditionally these records are kept manually. With the advent of ICT, there had been attempts to digitalize and introduce IT to medical records since early 1980's with varying levels of success. After the catastrophic Tsunami that had wreaked death and destruction in the coastal areas of Sri Lanka at the end of 2004, most of the manual records in the affected area were destroyed. This again emphasized the need for safe, secure, easily retrievable medical records. The way forward was to introduce electronic medical records. A consortium of Austrian Swiss Red Cross with the assistance from WHO and the guidance from Provincial Health Authorities of the Eastern Province developed and implemented an electronic patient record system in some hospitals in the eastern province. Even though this system was developed in Sri Lanka its reliance on a proprietary database was a drawback to its extended use in the country.

A proposal was submitted ICT Agency of Sri Lanka to develop a Hospital Health Information System on free and open-source platform, identifying all gaps in all proprietary systems. It was named as hospital health information management system (HHIMS) and up to date remains as the most widely used health information system in Sri Lanka.

HHIMS software

The system allows hospital staff to keep paperless medical records, retrieve previous clinical records electronically, prints visit slips containing important information such as results of investigations and prescriptions, discharge summaries for patients to take home, produce health statistics and send electronic notifications of notifiable diseases to the relevant Medical Officers of Health. For the first time in Sri Lanka HHIMS generate morbidity data of OPD patients and allow hospitals to abandon some of their paper records resulting in greater efficiency. HHIMS responds to the needs of;1. Out Patients (OPD)2. Clinic Patients 3. In ward Patients

HHIMS is web-based system and it uses Linux, Apache, MySQL and PHP which are widely known as LAMP stack for server. The front end of HHIMS has been developed by using Java script, HTML5, CSS3 and Jquery.

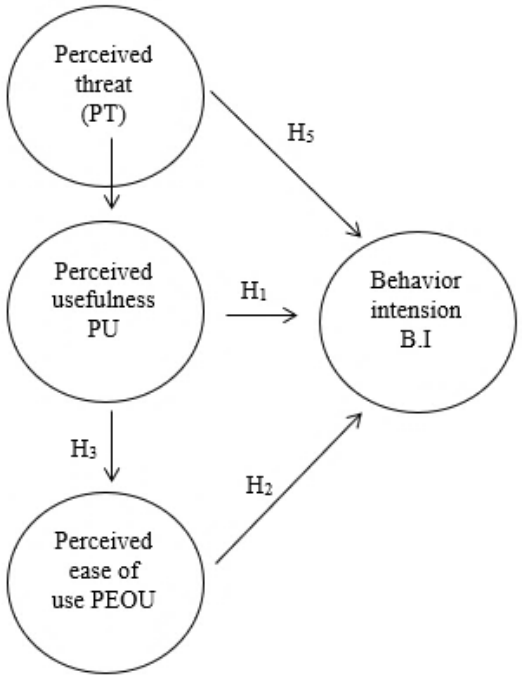
https://digitalcommons.usf.edu/m3publishing/vol5/iss2021/102
DOI: https://www.doi.org/10.5038/9781955833035

Nurses are one of the most important group of healthcare workers in the patient care team. Previous studies in hospital setting have adopted TAM to investigate the acceptance of HIS by hospital staff, including nurses (Kowitlawakul, 2011; Rawstorn et al. 200). To assess the acceptance of HHIMs software following hypothesis were tested. The model is shown in figure 2.

Hypothesis

- **H1:** Physician's perceived usefulness positively influence their intension to use IT related EDIS (Emergency Department Information System).
- **H2:** Physician's perceived ease of use positively influence their intension to use IT related EDIS.
- **H3:** Physician's perceived ease of use positively influence there perceived usefulness at IT related EDIS.
- **H4:** Physician's Perceived Threat negatively influence their perceived usefulness of IT related EDIS.
- **H5:** Physician's Perceived Threat negatively influence their intention to use IT related EDIS.

Figure 2. Research Model



Sample and Data Collection

The framework to address the research questions were developed by using TAM shown in figure1. It was modified by incorporating factors that influence a medical officer usage of medical information technologies. A previously validated questionnaire (Davis et as 1989, Walter & Lope 2 2008, Hu et al 1999). was used to collect data from the physicians. The model was tested using the sample collected from a large hospital in Sri Lanka. The hospital is an 800-bed hospital situated south of Colombo. The emergency department (ED) of the hospital serve about 350 patients per

day. It functions 24 hours per day throughout the year. The ED of the hospital is staffed with 20 doctors and 40 nurses. There are other additional non-medical staff to support the hospital operations. To improve the efficiency of services management decided to implement HHIMS software as an emergency department information system (EDIS) at the ED of the hospital. The survey was distributed among all medical officers recruited in the Emergency Department at the hospital selected. The data was analyzed using statistical software packages to test the above hypothesis.

Findings

The proposed hypothesis was tested by collecting data using survey method. Questioners were distributed to all the doctors who are working in the Emergency Department of a large hospital in Sri Lanka. The total number of participants in this study was 22 medical practitioners. The demographic data of the participants are given in table 1.

Table 1. Demographic Data of the Participants

Variable	Characteristics	%
Gender	Male	60%
	Female	40%
Age	Less than 30	32%
	30 - 40	67%
	40 - 50	1%
Service Experience	Less than 10yr	56%
	10 - 20yr	27%
	More than 20yr	3%
Experience of IT use	Less than 2yr	4%
	2 - 5yr	28%
	More than 5yrs	68%

As shown in table 1, almost all participants were younger than 40 years of age. Most participants had more than 5 years of experience in using information technology tools. However, most participants were relatively less service experience in the hospital setting.

The components of each hypothesis were measured by various questions. Each variable was tested using at least five questions. Summary of the variables and the measurement items are given in table 2.

Table 2. Measurement Items

Variable	Measurement Items
B.I	Part A 12, 13
	Part B 10,11,12,13
PU	Part B 1-9, 14
PEOU	Part A 1-8, 14
P.T	Part A 9, 10

In order to test the hypothesis, the mean and the standard deviation were calculated for each construct. The results are shown in table 3.

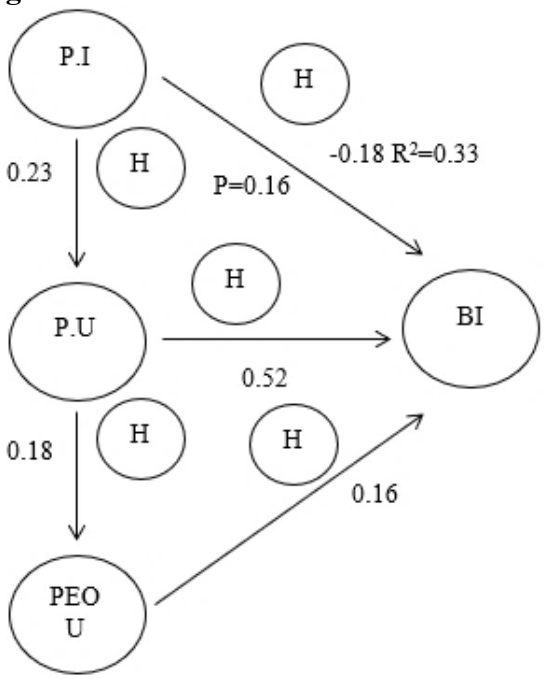
https://digitalcommons.usf.edu/m3publishing/vol5/iss2021/102
DOI: https://www.doi.org/10.5038/9781955833035

Table 3. Criteria for Determining the Quality of the Responses

Construct	Mean	SD
BI	3.75	0.63
PU	.68	0.64
PEOU	4.1	0.71
PT	1.1	0.68

The correlation coefficient and the p value for each of the hypothesis were calculated. Also, the model fit was determined. The results showed that preserved usefulness is positively influenced the behavioral intention. This means if physicians see the positive value of the information systems, they are more likely to use them. These results are similar to earlier studies (see Pare, Sicotte, and Jacques, 2006). Therefore, hypothesis 1 is supported. The results also show that PEOU is positively influence the use of EDIS (behavioral intention). As indicated by the correlation coefficient, this is a relatively weak support. Previous studies have shown similar outcome as some it does support (Pare, Sicotte, and Jacques, 2006; Yi et al. 2006) while others show that the perceived ease of use does not influence behavioral intentions (Chau and Hu 2001). This may be due to physicians are more interested in getting the work done than making their life easier. Therefore, the hypothesis is supported. Lastly, the results also shows that perceived ease of use is positively influence the preserved usefulness. This is also like the findings of the previous studies (Pare, Sicotte, and Jacques, 2006). The summary of the results is shown in figure 3. Previous research has shown that that the physicians desire the flexibility of information system and ability to their l is critical for physician technology acceptance (Ketikidis et al. 2012).

Figure 3. Results of the Research Model With Correlation Coefficient



The analysis also suggested that both hypotheses related to the preserved threats were not supported. This may be related to the general understanding of usefulness and acceptance of information technology in their daily operations in the hospitals. The summary of the results is shown in table 4.

Table 4. Summary Results of Hypothesis Test

Hypothesis	Supported	Correlation
P.U Positively influence the utilization of EDIS (BI)	Yes	0.52 (P<.001)
PEOU positively influence the use of EDIS (BI)	Yes	0.16 (P<0.01)
PEOU positively influence the PU	Yes	0.18 (P<0.01)
PT positively influence the use of EDIS	No	-0.19
PT positively influence the intension to use of EDIS	No	-0.23

Conclusions

Many organizations use technology as an integral part of creating sustainable advantage. Firms relies mostly on technology transfer to gain quick advantage over others (Jagoda and Ramanathan, 2003; Jagoda and Ramanathan, 2007). Deployment of information technology tools and application in the health care industry has become popular topic in health care management. As nay system, the success of the systems depends upon user acceptance of technology. Recent literature has shown that there is low acceptance of acceptance of health information technology applications resulting in delays, and failure to achieve the intended outcome. By using a survey data collected from a developing country setting, this research attempted to address this problem by using TAM as the framework. Results shows that perceived usefulness has the greatest positive effect on use of EDIS. PEOU positively influences the intentional behavior to use the system and it has a positive effect on PU. PT do not have effect on the use or intention to use the EDIS. Although the results of this study are consistent with the findings of previous studies, it has some limitations and opportunities for further improvement. First, the sample collected was from one hospital. If the data could be collected form a large sample, the validity of the finding will be improved. Second, it would be important for the policy makers and hospital administrators to investigate barriers to physician technology acceptance. This will help them to create collaborative organizational culture and improve teamwork. Finally, it would be interesting exercise to compare this study results with other developing and newly industrial countries where healthcare is partially privatized.

References

Ahmad, Ashfaq, et al. (2020). Understanding Factors Influencing Elderly Diabetic Patients' Continuance Intention to Use Digital Health Wearables: Extending the Technology Acceptance Model (TAM)." Journal of Open Innovation: Technology, Market, and Complexity, vol. 6, no. 3, 2020, p. 81-96.

Chau, P., and P. Hu. (2001). Information technology acceptance by individual professionals: A model comparison approach. Decision Sciences 32 (4): 699–720.Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, MIS Quarterly 13(3), pp. 318–340.

Holden RJ, Brown RL, Scanlon MC, Karsh BT: Modeling nurses' acceptance of bar coded medication administration technology at a pediatric hospital. J Am Med InformatAssoc 2012, 19(6):1050–1058.

Hsiao, Ju-Ling ; Chen, Rai-Fu, (2016). Critical factors influencing physicians' intention to use computerized clinical practice guidelines: an integrative model of activity theory and the technology acceptance model, BMC medical informatics and decision making, Vol.16 (1), p.3-3

Hsiao, Ju-Ling, and Rai-Fu Chen. (2016). Critical factors influencing physicians' intention to use computerized clinical practice guidelines: an integrative model of activity theory and the technology acceptance model." BMC Medical Informatics and Decision Making, vol. 16, no. 1, 3,-3

Jagoda, K. and Ramanathan, K. (2003), "A stage-gate model for guiding international technology transfer", CD-ROM Proceedings of PICMET, Portland, OR, 20-24 July.

Jagoda, K. and Ramanathan, K. (2005), "Critical success and failure factors in planning and implementing international technology transfer: a case study from Sri Lanka", CD-ROM Proceedings of PICMET, Portland, OR, 31 July-4 August.

https://digitalcommons.usf.edu/m3publishing/vol5/iss2021/102
DOI: https://www.doi.org/10.5038/9781955833035

Ketikidis P, Dimitrovski T, Lazuras L, Bath PA. Acceptance of health information technology in health professionals: An application of the revised technology acceptance model. Health Informatics Journal. 2012;18(2):124–134.

Kowitlawakul Y: The technology acceptance model: predicting nurses' intention to use telemedicine technology (eicu). ComputInformatNurs 2011, 29(7):411–418.

Lee Y, Kozar KA and Larsen KRT. (2003) The technology acceptance model: past, present, and future. CAIS, 2003; 12: 752–780.

Pare, G., C. Sicotte, and H. Jacques. 2006. The effects of creating psychological ownership on physicians' acceptance of clinical information systems. Journal of the American Medical Informatics Association, 13 (2): 195–205.

Rawstorne P, Jayasuriya R, Caputi P: Issues in predicting and explaining usage behaviors with the technology acceptance model and the theory of planned behavior when usage is mandatory. In Proceedings of the twenty first international conference on Information systems: 10–13 December 2000; Brisbane. Australia: Association for Information Systems; 2000:35–44.

Sıcakyüz, Ç., & Yüregir, OH. (2020). Exploring resistance factors on the usage of hospital information systems from the perspective of the Markus's Model and the Technology Acceptance Model. Journal of Entrepreneurship, Management and Inovation, 16(2), 93-129.

Szajna B: Empirical evaluation of the revised technology acceptance model. Manage Sci 1996, 42:85–92.

Wu IL, Li JY, Fu CY. (2011). The adoption of mobile healthcare by hospital's professionals: an integrative perspective, Decis. Support Syst. 2011;51:587.

Yarbrough AK, Smith TB. (2007). Technology acceptance among physicians: a new take on TAM. Med Care Res Rev. 2007;64(6):650.-672.

Yi, M. Y., J. D. Jackson, J. S. Park, and J. C. Probst. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. Information & Management 43 (3): 350–63.