

A QUALITATIVE APPROACH TOWARDS ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY BY MEDICAL DOCTORS APPLYING UTAUT MODEL

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ABSTRACT

Abstract- The purpose of this study is to identify the level of adoption of information and communication technology, based on UTAUT model core determinants (performance expectancy, effort expectancy, social influence and facilitating condition), among medical doctors in their profession. Methodology- In this present investigation, the researchers attempt to unearth the level of adoption of Information and Communication Technology applying UTAUT model among medical doctors through semi-structured interviews. In this endeavor, the researchers conducted a qualitative study based on UTAUT model variables. Findings- In developing countries like India, doctors believe that information and communication technology adoption is based on the following UTAUT factors: performance expectancy, effort expectancy, social influence, facilitating condition, behavioural intention and use behaviour.

Keywords: E-Health, UTAUT Model, ICT, IT adoption, Health Informatics

INTRODUCTION AND REVIEW OF LITERATURE

Information and Communication Technology is denoted as a 'key instrument' in healthcare delivery and public health, internationally (Drury 2005); the health sector has always depended on technologies. According to WHO (2004), technologies are the vertebrae

of the medical sector in treating illnesses. Innovations in information technology and related use has hastily amplified in all development contexts of healthcare.

Constant improvement in information and communication technologies (ICT) - including internet, technical devices and powerful computer systems - have made a greater impact in increasing the use of these technologies in the practice of medicine and as a provision for medical care. This has led to a new dimension towards technological implementation towards the field of medicine with a great impact on the society (Jayaseelan, Pichandy et.al. 2020).

In this contemporary world, the emergence of information and communication technology (ICT) has unprecedented social impact with penetration into all the contemporary professions ending up as an inevitable instrument. No discipline can afford to ignore ICT, lest they will be informationally disadvantaged. Information and communication technology is one of the prominent media through which the world is constantly experiencing changes (Youth report, 2003).

The field of medicine, which is otherwise called as health sector, is increasingly dependent on technologies. ICTs are becoming an important factor among the vast array of technologies which may prove to be of use in health sectors. Given the right policies, organization, resources and institutions, ICTs can be dominant tools in the hands of right people who are trying to make advancements in the health sector.

HEALTHCARE IN INDIA

Healthcare sector in India has witnessed a massive growth in the past few years with regard to quality as well as capability. Relatively, the cost of healthcare is very low while compared to developed countries and the quality of treatment is at par with international standards and has placed India as a major place for medical treatment (Jayaseelan, Pichandy et.al., 2020) (Reddy, S. & Qadeer, I., 2010).

Information and communication technologies are evolving at a tremendous rate. It is very difficult to determine the size and distribution of medical professionals, who have access to ICT. Many people feel that India is on top in terms of accessing information and communication technologies; doctors here access the new media at a higher level (Thanuskodi 2010). Even doctors who are totally unfamiliar with internet have the desire to learn and use it. At a basic level, medical associations of various specialties maintain computer-related reports and proceedings in their annual meetings which necessitate the adoption and use of technology at various levels.

In the Indian context, e-health covers the interaction between patients and health-service providers, the transmission of data from institution to institution and peer-to-peer communication between both patients and medical doctors. This concept also covers health information networks, electronic health records, telemedicine services, wireless and portable communication systems, health portals, etc. C. Pichandy and R. Jayaseelan,(2015) (Kanungo 2004).

Mishra and Indra (2009) point out that, India with its diverse landmass and huge population is an ideal setting for telemedicine. Telemedicine activities were started in 1999. ISRO has formed a SATCOM-based telemedicine network across the country since that year. Various government agencies — Department of Information Technology and Ministry of Health & Family Welfare, State Governments, Premier Medical and Technical Institutions of India — have taken initiatives with the aim to provide quality healthcare facilities to the rural and remote parts of the country. With its large medical and IT sectors and expertise, India has now turned up as a leader in the field of telemedicine.

Saroj Mishra and Ganapathy (2008) opine that India is starting to make strides in the fields of telemedicine and e-health. Most telemedicine activities are in project mode, supported by the Indian Space Research Organisation (ISRO) and Ministry of Information & Communication Technology and being implemented through state governments. A few corporate hospitals in India have developed their own telemedicine networks, prominent among them being the Apollo Telemedicine Networking Foundation, which commenced telemedicine operations as early as January 2000. There are around five hundred telemedicine programmes conducted across the nation.

Corporate healthcare in India is growing fast and they are adopting the latest technology to provide best quality treatment to face the competition (Deepalakshmi 2008). In support of such measures, agencies like the Development Gateway Foundation provide web-based information sharing platforms for developing countries. It holds an online community for professionals working on e-governance initiatives.

This is a qualitative study which adopts the Unified Theory of Acceptance and Use of Technology (UTAUT) to observe the fact of medical doctors' adoption of information and communication technology. UTAUT incorporates eight theories of individual acceptance into one ample model intended to assist in understanding the factors that either enable or hinder technology adoption and usage. As such, it serves a useful lens to view the current happenings in healthcare industry regarding information and communication technology

adoption and this study assumes importance and is being set to arrive at meaningful inferences and a conclusion.

OBJECTIVES OF THE STUDY

The main objective of this study is to identify doctors' adoption of information and communication technology based on UTAUT model core determinants (performance expectancy, effort expectancy, social influence and facilitating condition).

METHODOLOGY

A qualitative research approach for this study was chosen because qualitative methods are especially useful in discovering the meaning that people give to events they experience (Merriam, 1998). Specifically, the phenomenological method was used to understand how participants make meaning of the phenomenon being studied, i.e., the adoption of ICT in healthcare profession. Phenomenology is effective in studying a small number of subjects – in this case, 15 participants – to identify the core of their experiences with the phenomenon (Creswell, 2003) and to produce patterns and identify relationships of meaning that build new knowledge (Moustakes, 1994). The qualitative research methods used for this study are described further below and include purposive sampling, open-ended interviewing, and systematic and concurrent data collection and data analysis procedures. Specifically, the grounded theory or constant comparative method (Glaser & Strauss, 1967) was used to analyze how a medical doctor tries to adopt ICT for his/her profession.

UTAUT MODEL

Venkatesh et al.'s [2003] UTAUT model draws upon and integrates eight previously developed models and/or theories that relate to technology acceptance and use. Theoretical underpinnings include the Theory of Reasoned Action [Fishbein and Ajzen 1975], Technology Acceptance Model [Davis 1989], Motivational Model [Davis et al. 1992], Theory of Planned Behaviour [Ajzen1991], a combination of Technology Acceptance and Theory of Planned Behaviour models [Taylor and Todd 1995a], Model of PC Utilization [Thompson et al. 1991], Innovation Diffusion Theory [Rogers 1995; Moore and Benbasat 1991], and Social Cognitive Theory [Compeau and Higgins 1995a; Compeau and Higgins 1995b]. The core constructs asserted to impact behavioural intention to use technology are performance expectancy, effort expectancy, and social influence. Facilitating conditions are asserted to impact directly on use behaviour.

PERFORMANCE EXPECTANCY

As enumerated by Venkatesh et al., (2003) performance expectancy is construed as one's belief that adopting ICT in one's own profession may help in attaining enhanced job

performance. Further explained, performance expectancy has its roots from the perceived usefulness, extensive motivation, job fit, relative advantage and outcome expectation. This has been amplified by various studies (Davis, Bagozzi & Warshaw 1992; Taylor & Todd 1995; Venkatesh & Davis 2000; Venkatesh et al., 2003) where it was found that performance expectancy is a chief factor in predicting the intention of adopting ICT in one's own profession.

As a matter of fact, in the borderless global media scenario, the doctors, in order to remain job fit have to look for not only adopting the best medical technologies but also the know-how of applying these technologies. In this scenario, the knowledge technologies namely ICT play an important role in bringing about access to best practices in the world and thereby enhance the professional performance of medical doctors. In this process, one should not overlook the outcome of such ICT health practices contributing to the overall improvement of the health of people around the world as observed by WHO (2004). Of all technologies in the world, constant change, modification and improvisation are being witnessed in the field of medicine. These technologies are having profound impact on medical practitioners who need to keep pace with the changing technological scenario and these emerging technologies prove to be a major factor in the quality and performance enhancement of treating patients (Bhatia JS and Sharma, 2006) (Hiroshi Takeda et al., 2015) (Yaphe 2013) (Pamela Lewis Dolan 2012). In this changing context, the penetration and adoption of ICT by medical doctors did bring about a technological environment, thereby, creating a dynamic medical social environment, both with the doctors as well as the patients.

EFFORT EXPECTANCY

The term 'effort expectancy' can be elucidated as the degree of ease associated with the use of a system as observed by Venkatesh et al., (2003) with perceived ease of use desired from TAM (Davis et al., 1989), complexity and ease of use being its important components. Information and communication technology, considered as a professional tool, has become imperative to people from all walks of life. It makes the tasks of medical professionals simple and smooth. The degree to which a person considers it easy to use a specific system becomes the yardstick of its success. In case of physicians, operation of computers, internet, mobile phones including the structures of computer software and hardware, and their applications to healthcare (Li, 2008) are important. Medical professionals should acquaint themselves with healthcare information systems (Pai and Huang, 2011) (Jayaseelan, Pichandy et.al. 2020) including enormous event reporting systems (We et al., 2008), which are likely to make their tasks effortless.

In an ever changing ICT scenario, numerous software that are conducive for physicians are invented from time to time, competing for the attention of medical doctors (Adrian Cropper 2011). Clinical decision support (CDS) can improve pediatric emergency care (Michelle, Brooks et al., 2012) and this powerful and user-friendly software based on data management (Agarwal, Gupta, Sood et al., 2004) also greatly helps medical professionals. These systems offer current medical literature and reference guides to doctors. Besides, CDS also has several unique characteristics such as immediacy of access to various digital platforms and portability to the point-of-care and it greatly distinguishes itself from other traditional systems of knowledge (Kim and Neslin 2008).

It is noted that open source software have high potential to improve both clinical operation and interoperability of medical system, but at the same time, its usage goes with high risk (Shinji 2012). It is also suggested that a structured use of templates can minimize the efforts of doctors in generating medical notes (McIntyre 2004). Thus an understanding of database management system and exposure to it go a long way in making the doctors' profession not only easy but also efficient and holistic.

SOCIAL INFLUENCE

Social influence, in the words of Venkatesh et al., (2003) is 'the degree to which an individual perceives how important it is that others feel or believe he/she should use the new system;' the influence which a person has over the others, whom he/she considers important, concerning the use of a particular system, is also inclusive. The notion that ICT can be used only for the purpose of trade is deceitful in the contemporary world. As indicated by Maya Louk, Hyotaek Lim and Hoon Jae Lee (2014), information and communication technology can be and is used for healthcare by medical experts, pharmacists, nurses, medical doctors, hospital administration and also by patients.

In this tech-savvy world, communication skills and information processing are the most important factors of quality healthcare. Computers potentially alter the traditional manner that physicians had used to communicate with patients. Doctors in developing countries have strongly accepted and started using computer database system.

The most illustrious characteristics of ICT are reduction of errors and easy accessibility. With the Electronic Health Records (EHR) system, which contains patients' information which are entered by a single or multiple hospital departments, doctors can enter the details of patients and, with no trouble, retrieve them in the future (Jayaseelan, Pichandy et.al. 2020) (Paul C. Tang and Clement J. McDonald, 2006; Elmer, 2011). The hospital administration also gets a helping hand from these inventions just like the Computerised

Physician Order Entry (CPOE) which warrant flawless entries (Johanna, Hannele 2010). Doctors who are unfriendly to ICT are now pursuing themselves to a 'can-do' attitude towards solving problems related to Electronic Medical Records (EMR) and this change in attitude and storage system claim to have helped even the government in finding out the reasons for epidemic diseases and decide what actions must be taken to protect the public (E.M. Rogers, 1995; Mc Donald, 1997).

Hence, ICT system has a vast reservoir of storehouse of medico info that greatly helps not only the hospitals and doctors, but also public in healthcare. This contributes immensely towards sharing, exchanging, interacting and finding prevention or solution to many new diseases, epidemics, and pandemics.

FACILITATING CONDITIONS

Technology and healthcare have become inseparable. Development of healthcare is based on the development of technology. Facilitating conditions are variables that are expected to have a direct impact on system usage. They are defined as, 'the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system' (Venkatesh et al., 2003).

The use of ICT in health has increased significantly and many of the hospitals and administrations are rapidly getting computerised. Clinical information systems, internet, telemedicine, personal digital assistants, electronic patient records and other applications will inevitably occupy a commonplace in healthcare (CHIC Ltd 2002; NHIMAC 1999). Muchangi Mugo and Nzuki (2014) Lisa Rannefeld (2005), Ammenwerth, Buchauer and Bludau (2000) (Jayaseelan, Pichandy et.al. 2020) came out with an observation that healthcare has always tried to make use of the capabilities of emerging technologies so as to improve the quality of treatment. Hospital computer information system, intranet and other information and communication technologies (ICT) are increasingly aiding robust communications in the healthcare environment. Information and communication technologies have penetrated all the fields of work sectors wherein the government sector has also started to make its data electronic. As this advancement offers immense benefits, people are eagerly adopting it. In an organisation such as a hospital, it becomes mandatory for them to maintain electronic data, which can condense the amount of storage space as well as time. All organisations which need to enjoy these privileges will obviously provide workers with the necessary facilities to be updated technologically.

ICT implementation benefits healthcare-related organizations, such as hospitals and clinics by aiding the practicing doctors and hospital services besides the supporting staff by

making it easier for them to handle the increasing patient population (Bilal Ali Yaseen Nassar et al., 2011; Premkumar Balaraman and Kalpana, 2013). It also plays a major role as a tool for communication among medical doctors, patients and other users.

Sharing files and information within various sections of a hospital and among various other hospitals is made stress-free with the advent of software such as the Electronic Health Record. Shinji Kobayashi (2012) explores that many hospitals have adopted information systems to manage clinical practices. Commonly, a hospital needs integrated EHR software to administer clinical information from subsystems for various departments, such as laboratory, pharmacy, radiology, etc. The software is developed in such a way that it supports multiple languages and is, therefore, conveniently used in United States, Australia, Sweden, Holland, Israel, India, Malaysia, Nepal and Kenya.

ICT tools such as clinical information systems, personal digital assistants, electronic patient records and so on have become commonplace in the healthcare industry. They certainly make the work of doctors and hospital administrators effortless. Hospitals have also provided their workers with necessary tools, such as, software to enable easy and rapid completion of work.

BEHAVIOURAL INTENTION AND USE BEHAVIOR

Behavioural intention is asserted to have a direct impact upon individual's actual use of a given technology. Behaviour intention (BI) is a major determinant of usage behavior; behavior can be predicted by measuring BI. Behavioural Intention was proposed by Venkatesh et al., (2003) in the development of the UTAUT model.

Use behavior is adopted from TRA (Theory of Reasoned Action). In developing TAM, Davis et al., (1989) surmised the generality of TRA to explain a wide array of human behaviors. They suggest that use behavior should, therefore, be appropriate for studying the determinants of computer usage behavior as a special case.

As may be noted, the sector which is witnessing rapid changes and advancement in terms of technological changes, in the world, is the health sector. The field of medicine and the medical professionals have to keep pace with the changes in medical practices and application of technologies throughout the world, lest, the profession will make them obsolete and outdated. (Jayaseelan, Pichandy et.al. 2020) Shinji Kobayashi (2012) Hence, develop a voluntariness to adopt ICT as the practitioners of medicine are at risk to lose their identity and their patients if they do not catch up with the technology especially the developments that ICT has brought about in the health sector and this warrants the intention of the medical

doctors to adopt technology with all the developments that ICT has to offer in their field to remain in the scene.

DISCUSSION AND CONCLUSION

The Unified Theory of Acceptance and Use of Technology (UTAUT) model evolved after amalgamating eight other adoption theories and is considered a reliable and useful tool in understanding new technological diffusions and adoptions. In line with experimenting the relevance of the emerging areas of ICT adoption in healthcare sector, the present investigation explores the adoption of information and communication technology among medical doctors in India, because the Indian healthcare sector is growing at a tremendous pace attracting patients from across the world.

India is becoming a major health tourism destination of the world. However, India presents a paradoxical scenario where the healthcare sector is at cross-roads with extreme urban-rural dichotomy, lack of professionally trained medical doctors and supporting staff and the major high-end multi-specialty facilities concentrated on major metro and cosmopolitan cities (WHO, 2012). Nevertheless, the healthcare sector in India is one of the major recipients of foreign direct investments (FDI) with \$2191 million for the hospitals and \$741.80 million for surgical and other technological equipment between April 2000-December 2013 (Audit and Assurance Tax, 2013).

In order to keep pace with the changing and developing environment with regard to technology and adoption of the same in all fields, the doctors and other healthcare professionals are no exceptions. They have to update along with others to keep themselves in line with the changing world with advancements and developments. The medical doctors have change their behaviour towards learning, adapting to and using the technology that dominates all sectors including healthcare. This behaviour is needed for them to keep pace with the changes in medical practices and application of technologies in related areas so as to keep themselves from becoming. Medical practitioners are catching up with latest technology through ICT usage to retain their identity as well as their patients.

With the vibrancy and dynamism with which medical tourism is emerging, India is recognized as the cradle for test tube babies and is popular for surrogacy (Qaders and John, 2009). Other than these, India offers high-tech cardiac, paediatric, dental, cosmetic and orthopaedic surgical services as well as the traditional healing systems. The medical tourism definitely does not cater to emergency services. The services provided largely are knee joint replacement, hip replacement, bone marrow transplant, bypass surgery, cosmetic surgery, etc.

Hospitals also advertise for preventive health check-ups for family members accompanying the patients in addition to alternative medicine services (Yongbeom K, 2009).

Further, some of the developments that can be applied are:

- ICT training in medical education.
- Awareness workshops should be conducted for all the medical doctors related to ICT.
- ICT adoption practice should be made compulsory.
- E-health records should be maintained.
- Should create an ICT health system in the state and it should act as a model.

ICT is an inevitable tool in all fields of work, globally. As life saver, doctors should keep themselves updated about everything required for their profession, especially with regards to technology which helps them stay at par with their peers worldwide and also to render seamless, timely treatment to their patients. The current study extrapolates the relationship among the four core determinants (performance expectancy, effort expectancy, social influence and facilitating conditions), behavioral intention and use behavior to arrive at a conclusion.

With all organizations utilizing information and communication technology (ICT), the healthcare sector can also reap the benefits of it. Wilson and Anderson (2000) mention that while health information technology provides the greatest impact on administration functions, such as decreasing paperwork and workload of healthcare professionals, increasing administrative efficiencies and expanding access to affordable care, it also has shown effectiveness in preventing medical errors by enforcing clinical guidelines and protocols and reducing healthcare cost. ICT offers a wide range of tools to cut costs, improve efficiency, provide better consumer services, improve work quality, increase productivity, offer educational tools for both users and patients, aid self-care information to public, integrate tools across hospitals, offer online training for healthcare professionals, facilitate interaction between personnel in healthcare the setting, improve business capacity, increase internal efficiency and so on. Gradually, the traditional way of delivery healthcare is being replaced by e-health with the help of information and communication technology. ICT offers to aid achieving more accurate diagnoses, solving health-related problems, reducing medical errors, helps users self-evaluate and better decision making relatively improving patients' safety. Baldwin (2006) opines that ICT plays an important role in delivering healthcare today. ICT has become the key engine for the growth and performance of e-health sector. It assists medical professionals in coding, billing, registration, accounting, communicating amongst themselves as well as with others.

In sync with notions of the previous studies (Priyadharshini, Nandhini and Srikanth 2013; Nancy Linda Shimin et al., 2006; William and Charles 1994; McIntyre 2004; Clemmer 2004; Stephen Flowerday 2013; Fiona Chew, William Grant, Rohit Tote 2004; Garritty et al., 2006; Health management report 2004; Garritty et al., 2006; Mary Modahl, Lea Tompsett and Tracey Moorhead 2011), it is conclusively established that experienced medical doctors have a greater inclination towards the adoption of ICT resulting in their recurrent use of it. This study establishes that, in India, with increasing scope and demand for health tourism, hospitals are volunteering to upgrade their healthcare services to attain international standards and the government itself is taking initiatives to upgrade the healthcare industry with today's tech-savvy consumers demanding better healthcare and services. As such, these factors warrant the healthcare industry to adopt automation through ICT and therefore, medical doctors and health professionals in the Indian healthcare industry are more inclined towards adopting ICT accelerated by the all the core determinants of UTAUT model (Effort Expectancy, Performance Expectancy, Social Influence and Facilitating Conditions).

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