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A Modified UTAUT Model for Hospital Information Systems Geared Towards Motivating Patient Loyalty

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Abstract

Healthcare service institutions (HSIs) have sought ways to motivate patient loyalty in response to surging rates of medical tourism. Previous research indicates that Hospital Information System (HIS) is essential for HSIs to gather, measure, and analyze the massive amounts of data required to generate patient loyalty. There is currently no consensus on the factors that comprise HIS specifically geared towards motivating patient loyalty (HISPL). Furthermore, HIS requires full adoption by HSI staff to be effective. Thus, to reduce wastage of HSI resources, it is necessary to predict whether a given HIS specifically geared towards motivating patient loyalty is likely to be adopted. The purpose of this study is to reveal the factors that comprise HISPL and to modify the Unified Theory of Acceptance and Use of Technology (UTAUT) model to help predict the likelihood of an HISPL to be fully adopted by HSI staff. The results revealed that pertinent HISPL factors are capability, configurability, ease of use/help desk availability and competence (EU), and accessibility/shareability (AS). Using these factors, the UTAUT model was modified to fit the specific needs of HISPL. The modifications are theoretical and will have to be validated in future empirical studies.

Keywords: Hospital Information System, UTAUT, Patient loyalty, Patient satisfaction.

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Introduction

Healthcare service institutions (HSI) seeking to motivate patient loyalty have turned to Hospital Information Systems (HIS) as a means of achieving their organizational goals. HIS is a "comprehensive, integrated Information System (IS) designed to manage the administrative, financial, and clinical aspects of a hospital (Ahmadi et al., 2015). When implemented correctly, HIS can assist greatly in improving healthcare quality and efficiency, as well as improve patient outcomes and reduce medical errors by freeing medical staff to focus solely on their jobs (Zakaria & Yusof, 2016). HIS that is designed with the express purpose to motivate patient loyalty will be referred to in this study as HISPL. The primary goal of an effective HIS is to meet the needs of patients (Cantiello et al., 2016). However, due to the lack of direct interaction between patients and HIS, patients can only perceive the effects of HIS indirectly, that is, through the improved performance of HSI staff empowered by the HIS (Wijaya & Sulistyowati, 2019). HIS can motivate patient loyalty by empowering HSI staff, which improves patients' perceived service quality; the higher patients' perceptions of service quality are, the more likely they are to report being satisfied with their care, which would then motivate patient loyalty (Asnawi et al., 2019; Juhana et al., 2015; Lubis et al., 2017; Meesala & Paul, 2018; Rahmadita et al., 2018; Tosyali et al., 2019)

Prior research indicates that the effectiveness of HIS depends largely on its full-scale adoption by its end-users, the HSI staff (Handayani et al., 2017; Narattharaksa & Speece, 2016). An HIS may be well-designed and fully functional, but if HSI staff refuse to use it across the board, it will be no better than a malfunctioning HIS (Handayani et al., 2017; Narattharaksa & Speece, 2016). To be effective, an HIS must be adopted across the board by HSI staff (Narattharaksa & Speece, 2016). It is therefore necessary to ensure that an HIS meets the needs of HSI staff to ensure its efficacy in a real-world context (Shahzad et al., 2018). Before an HIS can be utilized by an HSI, it is essential to predict whether the HIS will likely be adopted by HSI staff to avoid wasting resources. To predict the likelihood of an HIS' adoption, the Unified Theory of Acceptance and Use of Technology (UTAUT) model was utilized. The UTAUT model was selected as it is the culmination of previous technology acceptance models in the field (Venkatesh et al., 2003; 2012). The UTAUT is the most widely cited model of individual technology acceptance and use (Venkatesh, 2012).

However, the original UTAUT model is not sufficient to predict the adoption of HIS, as it is a general model that must be revised depending on the context in which it is used (Venkatesh et al., 2003). The popularity of the UTAUT model is due in no small part to its adaptability into different contexts. The original UTAUT model was developed outside the healthcare industry, and focuses on individual adoptive behaviors (Venkatesh et al., 2003). As HSIs are large organizations, the UTAUT model must therefore be modified if it is to be used in this capacity (Venkatesh et al., 2011).

There is currently no research on the UTAUT model modified to predict the adoption of HISPL. To modify the UTAUT model for evaluating the adoption of HISPL, it will be

necessary to expand the original model's focus on individuals to entire HSIs. Furthermore, the modified model will have to account for the needs of HSI staff. Due to the paucity of research on HISPL and the lack of consensus on the factors of HISPL, conducting a literature review is necessary to modify the UTAUT model for predicting the adoption of HISPL. The objective of this study is to reveal the relevant factors of HISPL according to the literature, and to modify the original UTAUT model to accommodate the relevant factors of HISPL. To that end, the following research questions were generated for this study:

1. What are the factors of HISPL revealed in the literature?

2. How can the original UTAUT model be modified to address the HISPL factors revealed in the literature?

The rest of the study will be organized into the following sections: a review of the literature on factors that comprise HISPL, and the modification of the UTAUT model to account for the HISPL factors revealed in the literature review.

Litrecher review

This section contains the pertinent findings of the review, which reveal factors of HISPL. The findings will be divided into the four factors found to have a significant impact on HIPL, namely: capability, configurability, ease of use/help desk availability and competence, and accessibility/shareability.

Capability

Capability refers to the technical aspects of the HIS, or the ability of the HIS to accomplish healthcare goals. This includes the HIS' ability to collect pertinent medical data, facilitate communication between different individuals and departments within an HSI, appropriate system architecture, and fast response times for requests while ensuring that the data it collects is confidential and secure from outsiders (Farzandipour et al., 2017). Collecting, keeping, and analysis of data is a necessary component of any effective HSI functioning, especially as healthcare data accrues more and more worldwide (Roesems-Kerremans, 2016)

While one effect of HIS is easing the procedure of billing and payments, some scholars have argued that past investments in IT among HSIs have focused on this issue, and have so far failed to capitalize on the other benefits IT offers to the clinical needs of HSI, especially from the perspective of patients (Wang et al., 2018; Zakaria & Yusof, 2016). The lack of investment centered on easing the medical process for the customer manifests itself in the difficulty of procuring medical treatments in different parts of the world relative to how similarly information-rich industries function (Wang et al., 2018). Thus, it is fundamental for HIS to be designed around the fact that it is patient-centered, in that it assists HSIs to meet the needs of patients, and not just meet the needs of HSIs.

Configurability

Configurability refers to the ability of an HIS to be modified or changed depending on the needs of the medical personnel using the technology. Systems and work practices must be able to adapt to each other in order for an HIS to be effective (Handayani et al., 2017). Work practices refer to the "practices, procedures, and norms" at a given HIS (Hertzum & Simonsen, 2019). Because each HSI can have different areas of focus and requirements, an effective HIS must be able to be configured easily in order to adapt to any foreseeable situation (Bawack & Kamdjoug, 2018; Malik et al., 2019). In short, due to the multitudes of different contexts and situations of individual HSIs, an effective HIS must be an open, generic system that prioritizes flexibility so that the system can be configured for the HSI's specific needs (Hertzum & Simonsen, 2019)

An added complication is that requests about configurability may be routinely ignored by IT vendors without explanation, leading to difficulties with formal templates present in the IT solutions that they may feel fails to address the core tasks that necessitated the solutions in the first place. HIS developers must endeavor to make changes to the system intuitive for most HSI IT departments. IT vendors must also pitch in if IT departments need assistance configuring the HIS to their own specifications. Similarly, if end-users have issues with the HIS, their IT departments must be able to resolve their issues, with the assistance of IT vendors if needed (Abramson, et al., 2014; Bezbourah & Hamann, 2018).

Methodology

Ease of Use/Help Desk Availability and Competence (EU)

While younger medical staff have been seen to be more likely to engage proactively with IT solutions in healthcare, it is important to note that older medical staff may have the desire to do so as well but lack the competence that could be easily acquired if IT training is presented properly to staff (Abramson et al., 2014). Thus, it is essential that an IT solution for HSIs be accommodating of staff members who are not fully competent in the new technology by making them user-friendly to medical staff, to encourage full compliance and encourage their learning process. In case medical staff retains difficulties adapting, a help desk tasked with dealing with issues that arise from the IT solution must be ready to assist competently and promptly in a manner that will not dissuade staff from asking for help (Abramson et al., 2014; Bezbourah & Hamann, 2018).

The aforementioned difficulty of focusing on older medical staff can be compounded further in HSIs from developing countries, where computer literacy, technological competence, and willingness to learn among non-IT staff may be low. While newer IT technologies tend to be more streamlined and thus much simpler to learn and use, older staff may prefer older systems with which they are already familiar (Bawack & Kamdjoug, 2018). EU is important to assist in the adoption of new systems, whether from on-site technical

support or remotely, e.g., a call center. The reason is because an HIS' ease of use can reduce the learning curve, while help desk availability ensures that any difficulties learners face will be addressed promptly—thus avoiding the fears of some medical staff that learning a new system would be slower for them, potentially jeopardizing their patients' outcomes.

Accessibility/Shareability (AS)

For an HIS to be effective, it is necessary that the information it is tasked to handle can be accessed easily and conveniently by the many different departments and individuals within an HIS, to avoid delays, inconveniences, and potential harms (Malik et al., 2019). The importance of efficiency in terms of granting efficient access to medical information to the relevant medical staff not only improves service time, but also improves service quality by allowing different medical teams to coordinate with each other without losing time (Holmgren et al., 2016; Liebe et al., 2018).

An illustration of this is the fact that vascular surgery outpatient appointments are becoming more difficult to manage in recent years due to a lack of information (Hurst et al., 2016). As this information is essential for the success of the operation, additional work tracking them down is required of the medical staff, time that could be spent more productively. Some of the sources of this information include patient notes, referral letters from general practitioners or the patients' original doctor, and recent test results and scans.

The information must also be shareable to staff because inpatient and outpatient departments in HSIs tend to be structured independent of each other, and records from each may have to be repeated once the patient enters the other department, wasting time and resources (Kranz et al., 2018). This is especially important when a patient, in the course of an illness, enters many different phases of treatments, located in different departments within the HSI. For example, a person who enters the emergency room for a broken leg is confined to the inpatient department for further observation, then is transferred to home care for rehabilitative treatments. Each of these departments may not have access to information obtained in other departments, necessitating the collection of redundant information, causing delays and lack of transparency, both of which can impact the quality of healthcare, as well as the patients' perceptions of it (Kranz et al., 2018). Furthermore, reliable access of staff to medical data depends on a robust computer network with minimal delays.

The accessibility/shareability of medical information is essential to the pursuit of quality healthcare (Holmgren et al., 2016; Liebe et al., 2018). The more comprehensive one's medical record is, the more likely it is for medical staff to make well-informed decisions about the patient's care. The use of computerized medical records improves the quality and efficiency of HSIs because such records are much easier to share across different healthcare providers compared to paper records (Wang et al., 2018). The increased shareability of patient records and other important medical information could help facilitate shorter waiting periods and more efficient medical interactions between different departments and HSIs (Holmgren et al., 2016).

Findings

Modified UTAUT Model for HISPL

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was developed by Venkatesh et al. (2003; 2012), who aimed to consolidate the disparate views on technology acceptance to a single coherent model. UTAUT theorized that all such models utilized four core constructs that motivate behavioral intention—performance expectancy, effort expectancy, social influence, and facilitating conditions—and that these four core constructs were, in turn, moderated by individual characteristics, namely, age, gender, voluntariness, and experience. The original UTAUT model is provided in figure 1.

Performance expectancy refers to the degree an individual perceives the helpfulness of adopting technology in their job performance. Effort expectancy refers to the degree an individual perceives the ease of adopting a technology. Social influence refers to the degree in which an individual perceives others' beliefs that they should adopt a technology. Facilitating conditions refer to the degree an individual perceives the technical and organizational support they receive in adopting a technology (Venkatesh et al., 2003).

HISPL requires full adoption to be effective (Narattharaksa & Speece, 2016). Without full compliance by HSI staff, even an excellent HISPL will fail to bring about its goals (Handayani et al., 2017). Thus, to ensure that HSI resources are not wasted needlessly in developing HISPL, the use of a technology adoption model is needed to ensure that the HISPL will be likely adopted by HSI staff.

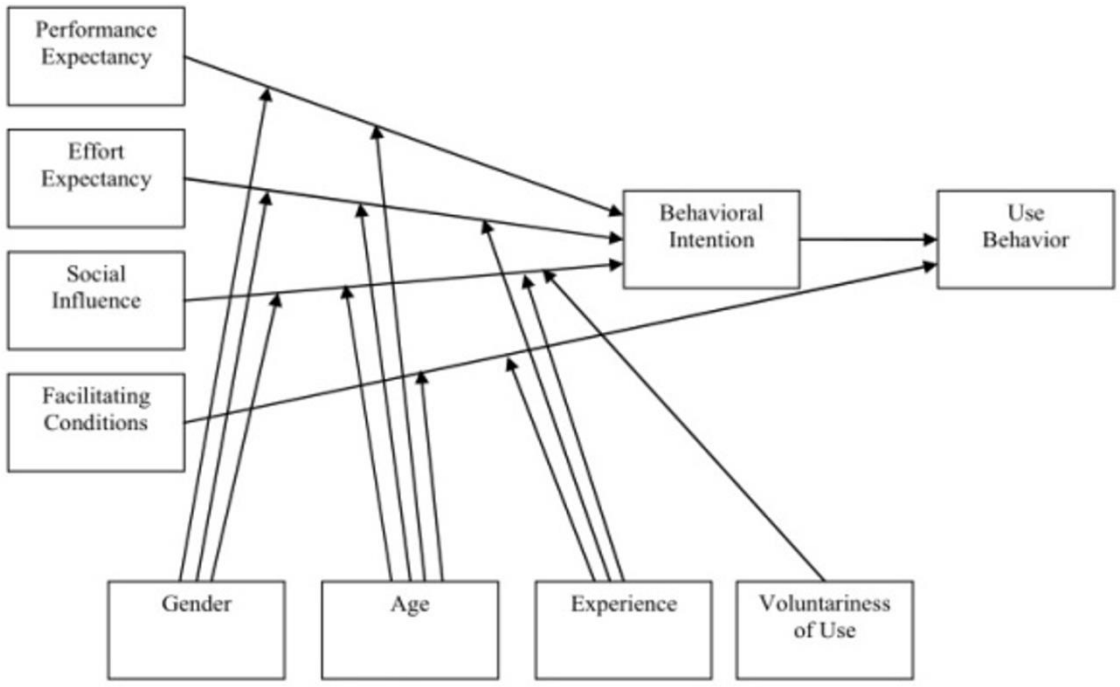

Figure 1. Original UTAUT model

Discussion

The choice to use UTAUT as the study's base technology adoption model is justified by the current status of UTAUT as the most cited model of individual technological acceptance and use (Venkatesh et al., 2011). Within the healthcare context, UTAUT has been used most often in predicting the adoption of electronic medical records (Alam et al., 2018; Cimperman et al., 2016; Jewer, 2018), but also in predicting acceptance of Information Systems among healthcare professionals (Sharifian et al., 2014; Venkatesh et al., 2003). Within healthcare, UTAUT has been most associated with predicting the individual use of electronic medical records (Alam et al., 2018; Cimperman et al., 2016) but has also been used in predicting the acceptance of Information Systems (IS) among healthcare professionals (Sharifian et al., 2014; Williams et al., 2015; Venkatesh et al., 2003).

To modify the UTAUT model, results from the literature review were used to reveal the factors that influenced adoption and use of HISPL. The revealed factors were capability, configurability, EU, and AS.

UTAUT was modified by eliminating the original UTAUT variables that had no relation to HISPL, as revealed by the results of the literature review. This meant eliminating social influence and facilitating conditions, and splitting performance and effort expectancy into two distinct constructs, to mirror HSI professionals' distinction between capability and configurability, as well as the distinction between EU and AS. Figure 2 shows the modified UTAUT model, based on the factors of HISPL revealed in the previous section.

The choice to simplify the original model by reducing the moderating factors to just one—namely, age—is supported by the results obtained by Venkatesh et al. (2011) in a study that tailored the UTAUT model for electronic health records. The modification is validated by the natural comparison between the modified constructs and the original UTAUT constructs, which have already been validated in previous studies. Assimilating the factors of HISPL as revealed by the literature review into the original UTAUT model to generate a modified model for HISPL is justified in (Venkatesh et al., 2003) as a way of creating an HISPL-specific UTAUT model, a method previously utilized by other studies of UTAUT in healthcare contexts (Ahlan & Ahmad, 2014; Zhou et al., 2019).

An additional factor in keeping age as the sole moderating factor is the strong evidence found for age's significant effects on technology adoption in developing countries, such as Cameroon (Ahlan & Ahmad, 2015), Ghana (Antwi et al., 2014; Zhou et al., 2019), and Brazil (Duarte & Azevedo, 2017). The factor of age may play a larger role than other moderating factors due to age affecting HSI staffs' ability to learn a new system (Abramson et al., 2014; Bawack & Kamdjoug, 2018), while factors such as gender, voluntariness, and experience are superseded by the organizational requirement to adopt new technologies such as HIS.

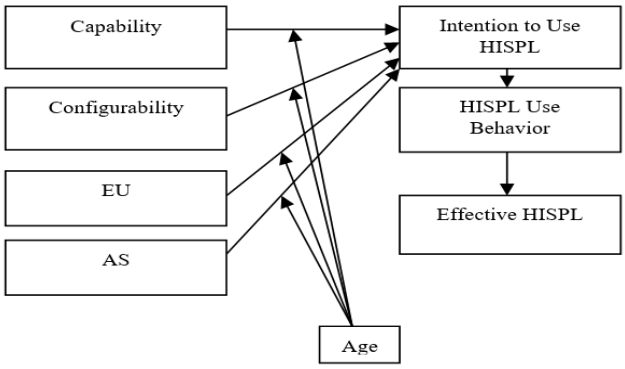

Figure 2. Modified UTAUT model for HISPL

The modified UTAUT model presented in this study is theoretical and will have to be validated in a future empirical study within a real life healthcare context. Based on the preceding literature review and discussion, it can be hypothesized that:

H1: Capability has a significant positive effect on HISPL adoption among HSI staff.
H2: Configurability has a significant positive effect on HISPL adoption among HSI staff.
H3: Ease of use/help desk availability and competence has a significant positive effect on HISPL adoption among HSI staff.
H4: Accessibility/Shareability has a significant positive effect on HISPL adoption among HSI staff.
H5: The influence of capability on HISPL adoption among HSI staff is moderated by age.
H6: The influence of configurability on HISPL adoption among HSI staff is moderated by age.
H7: The influence of ease of use/help desk availability and competence on HISPL adoption among HSI staff is moderated by age.
H8: The influence of accessibility/shareability on HISPL adoption among HSI staff is moderated by age.

The potential effect of HIS on patient loyalty is illustrated in figure 3:

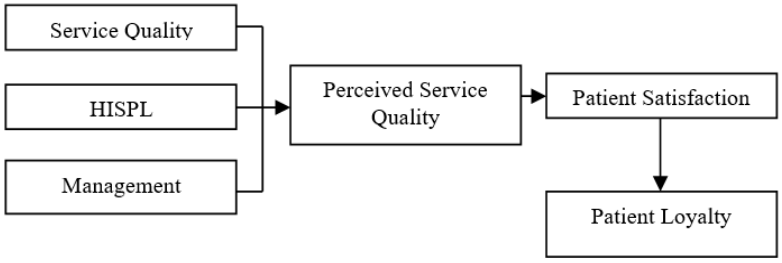

Figure 3. Relationship between HIS and patient loyalty

Conclusion

The study conducted a literature review on the factors that comprise a Hospital Information System specifically geared towards motivating patient loyalty (HISPL) in health service institutions (HSIs). HISPL is distinguished from HIS in general as no HISPL currently exists. While HIS can and does motivate patient loyalty indirectly by improving patient satisfaction, such effects are often secondary to the HIS' primary purpose of meeting administrative, financial, and clinical needs. For HISPL, attaining patient loyalty is the primary purpose. To that end, the literature review revealed that capability, configurability, ease of use/help desk availability and competence (EU), and accessibility/shareability (AS) are possible factors to HISPL.

Given that the efficacy of HIS in general depends largely on its full-scale adoption by HSI staff, the technology adoption model UTAUT was modified to fit the factors of HISPL revealed in the literature review. In the modified UTAUT model, the factors of facilitating conditions and social influence were dropped due to the lack of support found in the literature review. Performance expectancy was divided into two distinct components to mirror the distinction found in the literature between capability and configurability. Effort expectancy was similarly divided into EU and AS. Only age was retained as a moderating factor due to the strong support it received in UTAUT studies conducted within the healthcare field—especially in developing countries, where HIS can make the most improvements—while others received mixed evidence.

Future research will test the variables used in the modified UTAUT model for validity, with the ultimate goal of developing an HISPL for public HSIs in Oman.

Conflict of interest

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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