

Self-Efficacy and Personal Innovation: Conceptual Model Effects on Patients' Perceptions of PHR Use in Saudi Arabia

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Abstract: The study assesses the personal innovativeness and self-efficacy of patients, two external variables that are crucial in investigating patients' beliefs about the use of electronic health records (PHRs) in Saudi Hospitals. In a bid to expand the acceptance and subsequent use of technology literature, a conceptual framework was developed based on the use of related theories such as Use of Technology (UTAUT) and Unified Theory of Acceptance. Methods: The conceptual framework was developed in three phases. The first phase involved assessing various variables and theories; the most relevant were picked to explain the antecedents' influence of patients' beliefs about the use of electronic health records (PHRs) in Saudi Hospitals. The second phase involved assessment of academic literature related to the topic. The final phase involved the development of the conceptual framework grounded on the literature reviews to expound on the antecedents influence of patients' beliefs about the use of electronic health records (PHRs). Results: Since the framework depended on existing health information systems (HIS) theories, a conceptual framework was developed for examining antecedents' influence on the use of electronic health records (PHRs). The developed conceptual framework improves our knowledge of health information systems and electronic health records.

Keywords: *Personal Health Record, Individual differences, patients, Saudi Arabia*

1. Introduction

Health Information Technologies (HITs) encompass many goods and services. They include but are not limited to assistive technology and sensors, cloud computing, EHRs, technologies used in mobile health, and the tools used in monitoring, for example, medical devices (Ofori et al., 2021).¹ These technologies are essential while collecting, distributing, and using information for the patient's benefit. It is done with the help of healthcare providers and healthcare organizations based in the community. A Personal Health Record (PHR) is an electronic system allowing individuals to view, manage, and share their medical information (Cheng et al., 2022).² PHR is said to be an electronic application that provides privacy and an environment that is confidential and secure for individuals to view their health information.

Markle foundation defines PHR as an application done electronically that gives patients more control over their medical records (Foundation, 2003).³ It also enables them to share this information with healthcare providers, family members, or other authorized individuals as necessary (Tang et al., 2006).⁴ PHR systems are becoming increasingly popular and gaining recognition worldwide as they give people more power to look at their health

information (SooHoo et al., 2022).⁵ These systems are designed to cater to the needs of individual health and offer various data, tools, and functions. They aim to promote better health management.

A PHR as defined by Assadi and Hassanein (2017) is a comprehensive health history summary that details various aspects of their medical history, such as procedures, significant illnesses, allergies, and blood pressure.⁶ It utilizes devices monitoring homes, the family's history, laboratory test results, and any necessary information relating to the patient's history. Using tools and functionalities, access to the health records assists in managing the patient's health, enabling communication and sharing records with the clinicians (Kaboutari-Zadeh et al., 2022).⁷ The patient's information is managed and updated by the individual or a designated person. PHR provides individuals with a tool to manage their health and facilitates communication and record sharing with healthcare providers. The term "consumer" and "patient" are used interchangeably in the context of PHR. There are terms used in this study, like individual, patient, and consumer (Pandita, 2022).⁸ They can be used interchangeably because, for instance, a consumer can be healthy or sick. After all, they do not necessarily deal with medical information.

A well-implemented PHR (Personal Health Record) system can bring about significant improvements in the healthcare industry. According to Cramer et al., (2022) and Alshafi et al.,(2022) by enabling patients to access

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and manage their medical records online, PHRs help bridge the gap between patients and healthcare providers, leading to better communication and more informed information decision-making, and improved outcomes.^{9,10} In addition, PHRs can also help to reduce administrative burdens for healthcare providers, freeing up time and resources for delivering care. This allows for more streamlined and efficient care delivery and enables healthcare providers to focus on providing high-quality patient care.

Despite the potential benefits consumers can gain from using PHR systems, their widespread adoption has yet to be achieved, according to Kaboutari-Zadeh et al., (2022), Alsyouf et al., (2022), and Roehrs et al., (2017).^{11,12,13} This is due to several user challenges, as identified by Roehrs et al., (2017) and Alsyouf et al., (2022).^{14,15} The results of the studies showed that privacy and security concerns, lack of trust in the accuracy and completeness of the information stored in PHR systems, and lack of awareness and education about the benefits and proper usage of PHR systems were among the key challenges that users faced in adopting PHR systems. Other challenges include technical and user interface challenges, and a lack of standardization in the development and implementation of PHR systems.

To overcome these challenges, several steps have to be taken. First, collaboration and communication challenges related to Personal Health Records (PHRs) need to be addressed, such as ensuring the proper storage and accessibility of data and ensuring the information provided is comprehensive and tailored to the user's needs (Kaboutari-Zadeh et al., 2022; Alsyouf et al., 2023; Alhur, 2022).^{16,17,18} Secondly, issues of privacy, security, and trust are paramount. They must be addressed, including maintaining the confidentiality of health information, ensuring the integrity of stored data, who has control over it, who has access to it, and how it is transferred securely (Alsyouf, 2021).¹⁹ The third challenge is related to the infrastructure required for PHR solutions. For instance, efficient computer systems and scalable infrastructure to support PHRs on portable devices are crucial but sometimes could be more comprehensive (Rolnick et al., 2022).²⁰ Finally, there is a concern over integration, how medical information is obtained, and the terms used in storing the information on individuals' health information (Alsyouf & Ishak, 2018).²¹ Also, there is a need for interoperability between systems (Alsyouf et al., 2021).²² These challenges must be addressed to increase the adoption and success of systems of the PHR.

The health records of a person have the potential to offer numerous benefits to individuals. It includes increased control over how they access their information and more active participation in their healthcare management

(Kaboutari-Zaden et al., 2022; Cramer et al., 2022; Alsyouf, 2017).^{23,24} However, overcoming the challenges and barriers associated with PHR adoption is essential to fully realize these advantages. According to Tang et al., (2006) a better understanding of user adoption can be gained by linking technology with human behavior.²⁶ For individuals to fully take advantage of PHRs, they must be able to access their health information and have control over it (Swoboda et al., 2021).²⁷ However, it is important for users to continuously update their records to ensure that the system remains effective and accurate. This effort will ensure accurate information is recorded which could lead to informed based decision-making based on updated information. More research is needed to give details on how the adoption rates of PHR can be increased. This research should focus on the system's benefits for users and their level of interest in such a system. Ultimately, increasing PHR adoption will require a greater understanding of the link between technology and human behavior. Also, it enhances understanding of users' continuous investment of effort to keep their records up-to-date.

By giving individuals permission to have their health information and the management tools and monitor it, Patient Health Record (PHR) systems aim to empower people (Nazi, 2013).²⁸ This system is seen as a way to support patient engagement in their health and wellness. Additionally, it can assist in making sure that their health information is accurate and updated. People should be able to access and control their medical information through PHRs, allowing them to play an active role in managing their healthcare and moving away from the traditional passive patient model.

However, despite initial enthusiasm and predictions about the widespread adoption of PHR systems, usage has been lower than expected (Nazi, 2013).²⁹ This disparity between interest and actual usage is known as the "PHR paradox." The reasons for this lag in adoption are complex and need to be fully understood. According to Cramer et al., (2022), some studies indicated that several factors had been proposed as potential reasons for the lag in consumer adoption of PHRs.³⁰ Some key factors include concerns over privacy and security, lack of interoperability, limited awareness and understanding of the benefits of PHRs, and a general reluctance to change established habits and behaviors. The authors also noted that there is often a mismatch between what consumers expect from PHRs and what is provided, which can further hinder adoption. Archer and Cocosila (2014) found that Canadian patients need a greater understanding of what a PHR is and how it can benefit their health, which affects their willingness to use it.³¹ Interestingly, Barua et al., (2021) mentions that PHR also expands upon the UTAUT model.³² It achieves this by considering the unique elements that impact Saudi

Arabian healthcare consumers' use of PHRs. To better inform the creation of more successful promotional tactics for PHR usage, this research aims to understand better the enablers and barriers to adopting PHRs.

2. Theoretical Foundation

Several theories and models have been established to pinpoint the variables influencing end-users' adoption and utilization of health information systems. The Technical Acceptance Model (TAM) is one of the most well-known models. The model, frequently utilized in research on HIS utilization, accurately describes how users use the system (Maillet, Mathieu & Sicotte, 2015).³³ The Theory of Reasoned Action (TRA), which is the foundation of the TAM, investigates how environmental circumstances impact people's cognitive behavior (Alsyof et al., 2023).³⁴ People's emotional responses can be influenced by external elements like values, beliefs, and knowledge, resulting in an anticipated behavioral response, which is the actual use of HIS.

Venkatesh et al., (2003) developed a different paradigm, the Unified Theory of Acceptance and Use of Technology (UTAUT), where thirty-two constructs from numerous well-known models and theories were combined.³⁵ The UTAUT assesses information technology acceptability, and the model incorporates novel constructs, including effort expectancy (EE), facilitating conditions (FC), performance expectancy (PE), and social influence (SI) (Al-Syof, 2017).³⁶ They emphasize how simple and well-understood the system is by the technology used. The second factor is the power players in their workplace and the change-making strategies used. Additional constructs in the UTAUT include those for perceived behavioral control, benefits, and perceived subjective norms (Holden & Karsh, 2010).³⁷ The intention to use and, ultimately, the actual usage of the technology have all been proven to be significantly influenced by Holden and Karsh (2010).

The connection between expected effort, performance, and influence relating to social terms and enabling circumstances to utilize is essential. It is crucial to comprehend how medical experts view HIS. Venkatesh et al., (2003) aimed to develop a unified view of the factors influencing a user's acceptance and usage of information technology.³⁸ The authors reviewed various existing models and theories, including the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Theory of Planned Behavior (TPB). They found that these models needed more predictive power when explaining the actual usage of information technology. Venkatesh et al., (2003) indicated the desire to predict how UTAUT is used and how it has established this association. Even if the connections between the various models are still being tested, the UTAUT model is still a commonly used and

acknowledged framework for understanding the acceptance of HIS.

2.1 Models of Research and Hypotheses

The model being discussed, UTAUT, is a tool used to understand the use of technology. When referring to Personal Health Records (PHR), the model has been used to understand why patients might choose this technology (Tanhapour et al., 2022).³⁹ Two key factors are considered in this research: personal innovativeness and self-efficacy. The study is framed around the idea that an individual's belief in the effectiveness and usefulness of technology will influence their intention to use it.

H1: The likelihood that a patient will utilize a PHR will be impacted by positive Performance expectancy.

Performance expectancy is an individual's belief in the effectiveness and usefulness of technology in improving job performance. According to Venkatesh et al. (2003), it has been influential in all stages of technology acceptance.⁴⁰ This construct is effective in both mandatory and voluntary settings. Additionally, the extent to which a person believes they can competently use technology (performance competency) also affects their intended behavior. As a result, the first hypothesis of a research is that a patient's aim to utilize PHR will be positively influenced by their expectations in terms of performance.

H2: The likelihood that a patient will utilize a PHR will be impacted positively by effort expectancy. Another crucial concept in the UTAUT paradigm is expectancy in terms of effort, which focuses on how easy or difficult people believe technology is to use. According to research, healthcare workers are more likely to adopt technology if they think it's simple (Holtz & Krein, 2011).⁴¹ They ascertain this notion by asserting that constructs like the ease of use and complexity impact effort expectancy. These results support the research's second hypothesis, which states that a patient's intention to utilize PHR will be positively influenced by their expectation of effort.

H3: Positive social influence toward a patient

The study's main subject is what factors affect patients' decision to use their health records or PHR. Venkatesh et al. (2003) found that social influence, or the effect of other people's opinions on a person's purpose, was a major component.⁴² Social forces, arbitrary norms, and image comprise the three components of social influence. Social influence positively impacts behavioral intention. As a result, it is assumed that social influence will benefit the patient's intention to utilize PHR.

H4: Influence resulted by favorable circumstances.

Facilitating conditions, or the degree of confidence in the organization's capability to help and support the patient while using technology, is another crucial aspect. The ideas of perceived behavioral control and compatibility are included in this concept. According to DeLone et al., (2003), enabling conditions, such as offering instruction and support for using technology, are objective elements that assist users in completing activities and achieving the organization's aim.⁴³ According to the literature assessment, good circumstances favorably impact the intention to use. Therefore, it is assumed that these conditions will benefit the patient's intention to utilize PHR.

H5: A patient's PHR usage is influenced by that patient's intent

Furthermore, the study assumes that patients' intentions to utilize PHR will benefit PHR utilization. This is corroborated by earlier studies such as Sheppard, Hartwick & Warshaw (1988), which demonstrated that behavioral purpose significantly affects usage.⁴⁴

2.2 Antecedent Factors

A popular model for forecasting technology use intentions is the UTAUT. Despite its popularity, Alsyouf & Ishak, (2018); Barnett et al. (2015) criticized it for not considering the individual factors influencing the acceptance and use of technology.^{45,46} It was proven that individual differences play a crucial role in using technology after they have accepted to implement it. Understanding the reasons behind the usage and acceptance is important. This is to make accurate predictions about its adoption. In addressing UTAUT limitation, personal factors must be considered in the analysis. Self-efficacy and innovation ability is key individual factors consistently identified in previous research (Zhong et al., 2020).⁴⁷ It has a significant impact on technology adoption. Self-efficacy is a term that roots in Bandura's 1977 social cognitive theory which argues that an individual's belief in their ability to do a duty and achieve the expected outcome is a crucial determinant of their behavior (Liu et al., 2022).⁴⁸ In addition, individual factors such as age, education, personality, and prior experience with technology can also play a role (Compeau & Higgins, 1995).⁴⁹ They do so by shaping an individual's acceptance and use of technology. For example, older individuals may have lower levels of self-efficacy with technology and be less willing to adopt new technologies.

Similarly, people with better education may be more likely to see the value in and use technology. Considering

these limitations, it is important to consider individual factors when predicting and explaining the acceptance and use of technology (Jaber et al., 2022).⁵⁰ By taking into account the complexities of individual differences, it is possible to gain a more nuanced understanding of the technology. It is also easier to adopt the process and to make more accurate predictions about its outcome. In the field of information systems, researchers such as Compeau and Higgins (1995), discovered that technological self-efficacy is a crucial factor.⁵¹ It is important because it determines one's opinions of different technologies (Lestari et al., 2020).⁵² According to Compeau and Higgins (1995), self-efficacy affects a person's expectations of the outcome, which can be either personal or performance-related.⁵³ There is a considerable correlation between a person's general self-efficacy and how simple a technology is to use (Assadi & Hassanein, 2017).⁵⁴ Early adopters of technology are regarded as creative and personal innovativeness is defined as a person's propensity to accept sophisticated information technology (Agarwal & Prasad, 1998).⁵⁵ Reinterpreting the idea of innovation, Agarwal and Prasad (1998) proposed a domain-specific strategy that forecasts a person's attitude toward innovation. Personal innovation is seen as a human trait associated with favorable views on technology use in the context of information technology.

Agarwal and Prasad (1998) also proposed that people create their opinions on technology by obtaining knowledge from various sources, including the media and interpersonal channels like peers, drawing on Rogers' idea of the spread of innovations. One can develop a favorable opinion of certain technology by hanging out with people with high levels of personal innovation. The following is the hypothesis based on these studies and other prior empirical and theoretical research. It has demonstrated how individual differences and characteristics affect how people use information technology by impacting beliefs (Maillet, Mathieu, & Sicotte, 2015).⁵⁶

H6a: Self-efficacy will positively impact people's perceptions of the Performance Expectancy of PHR.

H6b: Self-efficacy will have a positive effect on people's opinions regarding the efficacy of PHR.

H7a: Personal innovativeness will benefit people's beliefs regarding the Performance Expectancy of PHR.

H7b: Personal innovativeness will benefit people's ideas about the effort expectancy of PHR.

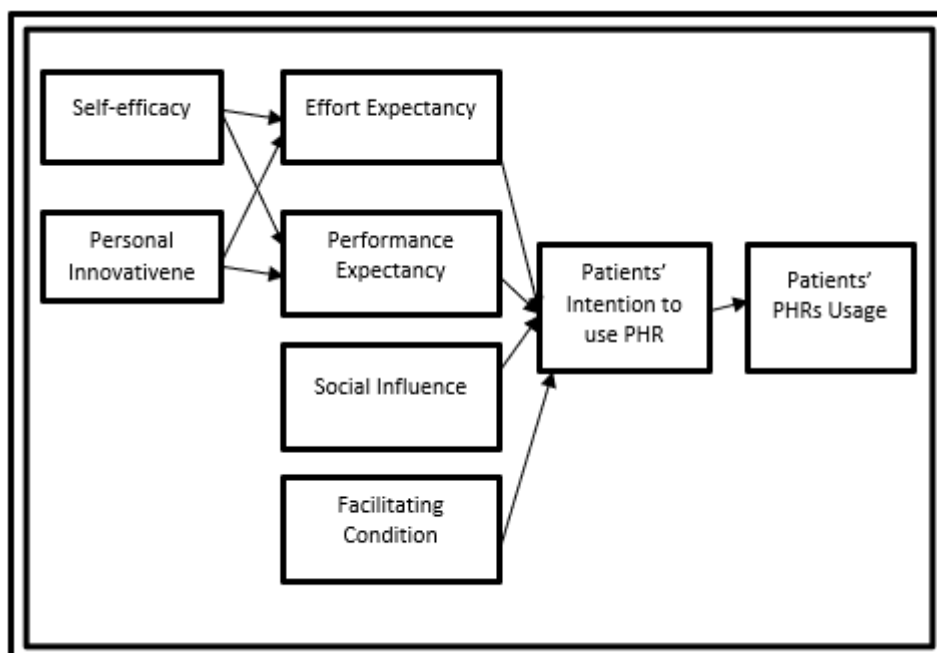


Figure 1 Research framework

3. Measures of the Study's Constructs and Variables

The current study will weigh the selected variables with those identified in previous information technology research. The study adopts a comprehensive approach, taking into consideration various aspects of the usage of technology as done in Salahuddin et al., (2020).⁵⁷ All of the following terms were drawn from Holtz and Krein (2011): the purpose of use, effort expectancy, effort expectancy, social influence, and facilitating conditions.⁵⁸ These variables play a crucial role in determining individuals' adoption and usage of technology.

There are three items for its use, five for performance expectations, five for effort expectations, eight for social impact, and six for facilitating conditions. These elements are regarded as major influencers in the acceptance and use of technology (Ardielli, 2021).⁵⁹ The term "self-efficacy" describes a person's confidence in their capacity to carry out a task. It was taken from Lewis, Agarwal, and Sambamurthy (2003), with ten items selected from their study.⁶⁰ Personal innovativeness, which refers to an individual's willingness to try new things, was also obtained from Lewis et al., (2003), with four items selected. The information analysis will be done using (SMART-PLS), a structural equation model, to evaluate the relationship in the conceptual model concerning the variables. SMART-PLS is a statistical method that helps examine the connection between indicators and latent variables (Mukred,, 2020).⁶¹ Using SMART-PLS will provide a comprehensive and accurate data report and analysis. This study is progressive work, and the results obtained from the data analysis. It will provide valuable insights into the usage of technology by individuals.

4. Conclusions

The study discussed in the text aims to evaluate the use of records of personal health (PHRs) and Business Intelligence (BI) in Saudi Arabia. It specifically focuses on patients' acceptance and adoption of these technologies. The research is motivated by the fact that previous studies on PHRs and BI have mainly taken place in developed countries like the United States, the United Kingdom, and Australia. The study's authors recognized that while there is growth in implementing PHRs in developing countries, adoption rates still need to be higher. This led them to research PHRs in Saudi Arabia, where they believe there needs to be more knowledgeable on this topic.

Furthermore, the study addresses the need for more focus on patients' acceptance of advanced technologies in the academic literature. The authors believe that patients are a crucial component of the healthcare system. Their role as the "forefront desk staff of hospitals" makes it important to understand their adoption tendencies. The current study was necessary because, despite their importance, the academic literature has yet to focus on patients' adoption of technology. In summary, the research aims to evaluate the use of PHRs and BI in Saudi Arabia. The main emphasis is on how the patients will accept the technology so that it can be integrated into the health system.

End notes

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