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Mgr Aref Shayganmehr

New technology adoption of Internet of Things in Iranian Healthcare centers

Doctoral Dissertation
Abstract

Dissertation written under the supervision of
dr hab. Mariusz Trojanowski
University of Warsaw, Faculty of Management
Marketing Department

Dr.Gholamreza Malekzadeh
Ferdowsi University of Mashhad, Faculty of Economic & Administrative Sciences

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1. Introduction

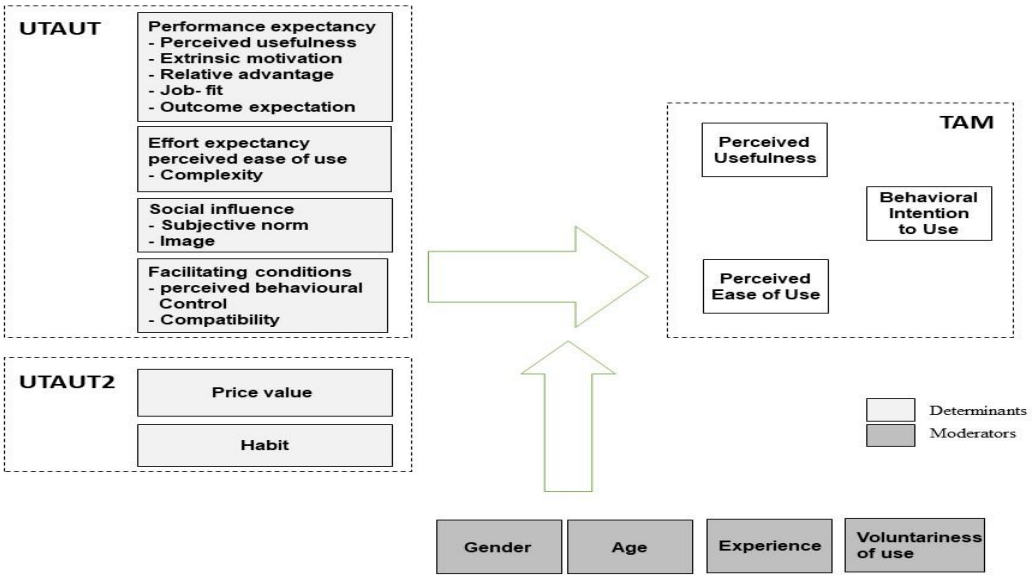
Nowadays, the number of mobile phones are higher than people and approximately more than 50 billion objects are connected to the Internet (Al-Fuqaha et al., 2015). According to forecasts, IoT will be the dominant market segment in health care systems by 2025. The economic impact of IoT will be between $ 3.9 and $ 11 trillion a year, or about 11% of the global economy (Turcu & Turcu, 2019).

The electronic healthcare record is one of the IoT systems in the Iranian health care system, and it has been mentioned as a third vertex of the health services triangle among the new health technology services (Baker, 2001; Chaudhry et al., 2006; Valdes et al., 2004; Wilson & Lankton, 2004). Electronic healthcare record is finding the most important technology to improve healthcare services. However, creating and using an electronic healthcare record is not easy, and it cannot achieve its predetermined objectives in most cases. Studies have illustrated that the use of electronic healthcare record in today's complex health system faces challenges and requires organizational preparedness and human resource preparedness. Studies have shown that only 5.1% of public acute care hospitals in the United States have a comprehensive electronic healthcare record system (Staroselsky et al., 2006). This value is 9.11% in Austria, 5.7% in Germany (Jha et al., 2009), and 10% in Japan (Erstad, 2003). The establishment of Iranian electronic healthcare records has also been emphasized in Iran’s Fifth Development Plan that is challenging in the healthcare system (Abdekhoda et al., 2016). The Internet of Things and health technologies have not yet grown in Iran. Practical experience in the healthcare sector is limited and its acceptance by health system users is low (Ghasemi et al., 2016). For example, health providers try to resist using electronic healthcare records (Abdekhoda et al., 2016).

Studies have indicated that the adoption of IoT technology, including the electronic healthcare record, is discussed as one of the significant challenges in the global health systems(Piette et al., 2008; Savolainen et al., 2008; Steele et al., 2009; Topacan et al., 2009; Whetton, 2005). Studies have shown that attitude and behavioral factors play a central role in new technology adaption (Backer, 1995; Terry et al., 2008b; Wager et al., 2005). Identifying behavioral factors is essential to remove human-social barriers,

especially user resistance (Alanazy, 2006; Morton, 2008; Nair, 2011; Wilkins, 2009). A survey of 375 organizations worldwide showed that users' resistance to technology adoption is the first reason for the failure of IT projects. Users' resistance to accept a new technology is significant because it depends on social factors, individual norms, and behavioral factors. Users' resistance is one of the critical reasons for systems failure in response to the change (Kim & Kankanhalli, 2009; Littlejohns et al., 2003; Martínez-Caro et al., 2018). User rejection and context are important factors in institutionalizing various types of health technology(Chang, 2015; Rahimi et al., 2018). Therefore, understanding users' behaviors and attitudes is the essential in predicting the adaption of technology, such as electronic healthcare record (Anderson et al., 2006; Morton & Wiedenbeck, 2009). The studies indicated that technology acceptance models have different functions in different context(Kim & Kim, 2018; Martínez-Caro et al., 2018). Pioneering studies on the technology acceptance in healthcare is limited, and some fundamental factors have only been conceptualized in existing studies (Steele et al., 2009). There are still areas that can be improved and expanded to increase the predictive performance of technology acceptance models(Rahimi et al., 2018). Fig 1) shows the extending of Technology Acceptance Models.

Fig.1. Illustrations of (1) the Technology Acceptance Model (TAM) as the "core" of a broader evolutionary structure, extending the UTAUT.



Source: Own elaboratioon based on Venkatesch, 2012

2. Research gap

Literature review on Health IOT technology, and EHRs systems shows some important research gaps that this study aims to address:

1: Adoption of Health IOT and EHR is challenging despite its benefits and it is international problem.

Studies show that the adoption of new technology has its challenges (Shaukat & Zafar, 2010). Most of the studies showed that it is the problem of acceptance and use of IoT systems in healthcare(Alansari et al., 2017; Chakraborty, Bhatt, Chakravorty, et al., 2019; Chakraborty, Bhatt, & Management, 2019; Sivathanu, 2018; Umair et al., 2021; Zou et al., 2020). According to the Jordan study, the physicians showed resistance to the new health technology acceptance(Al-Adwan & Berger, 2013). It is essential to ensure successful EHR acceptance between health providers But Researches showed that the level of acceptance of EHR systems is, low(Adler-Milstein et al., 2015; Alrawabdeh et al., 2015; Nakamura et al., 2010; Rasmi et al., 2020; Steininger et al., 2014; Wilkins, 2009). For example, the EHR acceptance in Saudi Arabian hospitals has a low ratio of less than 16%(Al-Adwan & Berger, 2013). Just 37% of Canadian physicians use EHR system, position Canada last between the eleven countries surveyed Comparison of EHR users' perceptions of barriers and facilitators to implementing EHRs(Gagnon et al., 2016).

2: Technology adaption model (UTAUT2) need to be modified for more accurate and specific for different contexts such as electronic healthcare record.

The literature shows that the effect of different explanatory variables on the model in different studies is very heterogeneous, and there is still a need for regular research to make the UTAUT2 model more accurate and specific for different contexts(Herrero & San Martín, 2017). The literature indicated that the effect of different explanatory variables on the model is very heterogeneous in different studies, and more research is still needed to make the UTAUT2 model more accurate and specific for different contexts (Herrero & San Martín, 2017). Only a few studies have entirely focused on Venkatesh's UTAUT2 model (Slade et al., 2013) and few studies have used UTAUT2 model in healthcare. A Literature Review of UTAUT2 shows that 17% of UTAUT2 articles were in the field of marketing, such as m-commerce, e-commerce, and social commerce, of which 13% were in social media, 13% in government service adaption, 13% in public sector context, and only 9% were in the health sector (Kułak et al., 2019). Previous studies of systematic review have considered at individual factors affecting physician EHR acceptance (Burt & Sisk, 2005; Ford et al., 2006; Loomis et al., 2002; Menachemi, 2006), but just few employed a theoretical model.

3: There is a lake of studies on the adoption of the Internet of Things in healthcare systems and EHRs systems.

There is limited study in Health IOT (Tavakoli et al., 2017). while technology acceptance model have been showed in relative to other aspects of healthcare technology, still EHRs needs more consideration and study due to the limited number of researches reported in the literature (Angst & Agarwal, 2009; Lai et al., 2015; Tavares & Oliveira, 2016).

4: Most studies have been quantitative and hypothetical and qualitative study is important to discover more factors and deeper investigation.

In 67 papers that selected for analysis just 9 papers (13%) have been qualitative study. Qualitative research aims to "understand and explain beliefs and behaviors in the context in which they occur" and to characterize them as an "interpretive and realistic" (Draper, 2004). Qualitative research is suitable to discover more factors and deeper investigation.

Problem statement and hypotheses

By filling the research gap and given the importance of technology in improving the health system and the lack of studies and specific models for detecting factors affecting Health technology acceptance, the main research problem of this study is to understanding health care technology Adaption while considering the:

- Acceptance of Health IOT
- Discover effective factors in EHR acceptance and modified UTAUT2 model for more accurate and specific for electronic healthcare record.
- Test new obtain model

The main research problem requires specific questions to be answered:

1. What are the factors affecting the acceptance of IOT technology among physicians in health centers based on UTAUT2 model?
2. Have do potential user perceive the adaption of IOT technology (Electronic Healthcare Records) among physicians in health centers?
3. Is the proposed model for the adoption of electronic healthcare record valid?

Research objectives:

1. Determinants of Physicians' Technology Acceptance for IOT in Healthcare Settings.
2. Finding new factors affecting Electronic Healthcare Records adoption in primary health care Settings.

3. Modified and validating a UTAUT2 model for Healthcare Settings.

3. Research setting

This research employed a mixed method as the research strategy using quantitative and qualitative methods. Johnson & Onogbozi (2004) refer to it as "a type of research in which the researcher mixes quantitative and qualitative research methods, techniques, approaches, concepts, and language" (Johnson & Onwuegbuzie, 2004).

This thesis was conducted in three stages. First study aimed to investigate factors affecting the acceptance of IoT technology in the Iranian health system using the UTAUT2 model.

Second study were conduct semi-structured interviews. Depth interview, and taking advantage of exploration and follow-up opportunities provide items that arise in the interview (Nunes et al., 2010). Then, factors affecting the adoption of IoT technology in health systems (the electronic healthcare information record system in Iran) were discovered and created a model based on the qualitative data collected from the interviewee and the focus group. Finally, the model was run in a quantitative study. the statistical population is health system employees who provide health services to the people, including all physicians, psychologists, nutritionists, midwives, health experts, and caregivers. Statistical samples in the qualitative stage were between health system experts, including those directly or indirectly associated with the electronic health care information record (which is known as the Apple system in Iran). These participants included officials and professionals in various service groups and levels who had at least ten years of work experience and a master's degree. In the quantitative, the sample size was determined using Cochran's formula. Considering that the statistical population was 15000 physicians, which was obtained with an error of 0.05 volume equal to 375 Sample, finally the number of questionnaires answered was 417. Moreover, the structural equation modeling test (SEM) was used for data analysis and testing of research hypotheses. The strategy of mixed methods has been used in various organization and management research studies. The discovery of phenomena in more detail and the testing of emerging

theories (Creswell & Creswell, 2017) are used to identify significant variables entirely consistent with the research purpose. Figure 2 showed the implementation of the research algorithm.

Figure 1. the implementation of the research algorithm

Source: Own elaboration

4. Doctoral dissertation structure

This thesis is organized as follows. The first chapter presents an overview of the extant literature on technology adaption theories. The first section of the first chapter lays the theoretical foundations Technology Acceptance Models. All of the theories in this context are summarized and, in this section, the development of the technology acceptance model that was examined over the past years categorized in four sections as follows: model introduction, validation, development, and evolution.

The second section is The Effect of Culture on the Acceptance of New Information Technologies. Studies indicated that cultural values are shaping cognitive processes and thus affect people's beliefs and behaviours toward technology (Srite et al., 2008). Nowadays, cultural values play a significant role in technology acceptance (Srite & Karahanna, 2006). The role of culture in information and communication technology has been of interest for researchers for a while (Leidner & Kayworth, 2006). Many investigations have highlighted the essential role of culture on technology popularity, diffusion, and development (Keil et al., 2000; Sia et al., 2009). Most technology firms have culturally embedded assumptions, which could conflict with the organization's values, beliefs, and norms; such embedded assumptions influence technologies as culture-bound (Nazir & Smucker, 2015). In conclusion, most culture-related technology acceptance studies focused on the cross-cultural comparison (Tarhini et al., 2017).

The third section is focused on Technology changes in healthcare industry. Healthcare in IoT industry is being considered one of the key industries and a special conception for it, considering the IoT on e-Health, otherwise known as Internet of Health Things. The IoHT can support many medical topics, including child and elderly care, chronic disease monitoring, and private health and fitness management. To better study this broad topic, in this section the IOHT considered into four general categories. This subsection purposes to provide a comprehensive taxonomy of the factors influencing the user acceptance of EHR. This section is a Systematic Literature Review, summarising multiple studies on adopting new technologies to identify related scientific publications.
The last section of the first chapter highlights the research gap that this study aims to address.

The second chapter outlines the research. This thesis was conducted in three stages. First study aimed to investigate factors affecting the acceptance of IoT technology in the Iranian health system using the UTAUT2 model. This study helped to find factors affecting the acceptance of IoT technology among physicians based UTAUT2 model. For gain an in-depth understanding of other factors affecting to the adoption of EHRs by their users. Second study were conduct semi-structured interviews. Depth interview, and taking advantage of exploration and follow-up opportunities provide items that arise in the interview (Nunes et al., 2010). Then, factors affecting the adoption of IoT technology

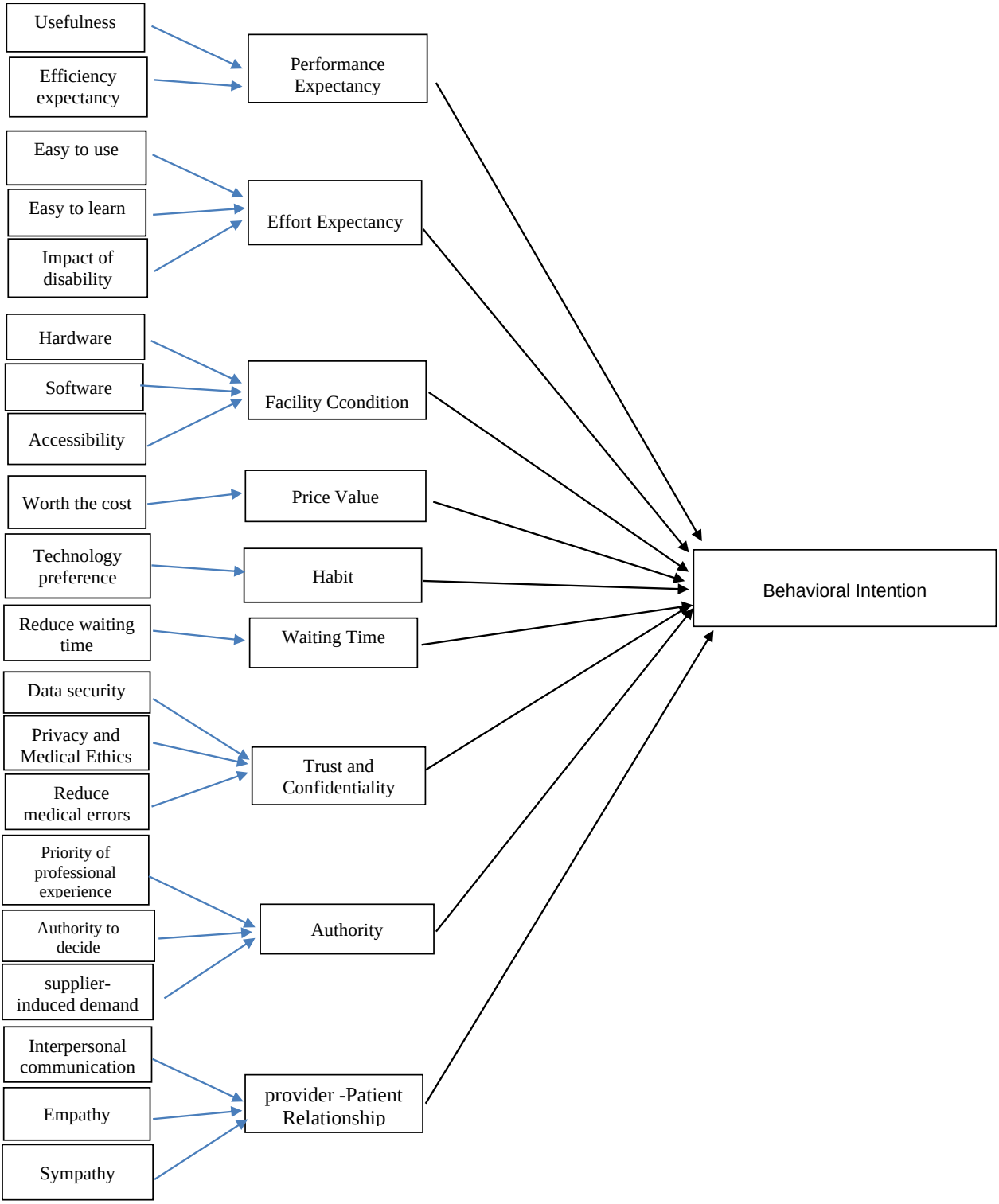
in health systems (the electronic healthcare information record system in Iran) were extend UTAUT2 model based on the qualitative data collected from the interviewee and the focus group. Finally in third study, the model was run in a quantitative study.

In the third chapter empirical results are described and discussed. The first section of the methods described in Chapter 2 were used to analyze the results of descriptive, analytical, and inferential data. This chapter aims to describe the qualitative results of interviews and statistical analysis of the quantitative data. In this chapter, the collected data were categorized and analyzed using appropriate statistical techniques. The first stage was conducted using UTAUT2 model. In this section describes the research hypotheses testing, and then the results of collecting qualitative data from semi-structured interviews and focus groups were presented. Finally, the obtained model was tested in last section and as well as the examination of influence effects in EHR adaption. The results are discussed in another section of the chapter. Finally, the last section of this study provides conclusion, theoretical and practical implications, limitations and directions for future research.

4. RESULTS

Based on the analysis of interviews and classification of categories, 20 separate mechanisms affect the nine structures of the UTAUT2 model and show the factors influencing the acceptance of technology in a health care system (Diagram 1). Data were collected from October to December 2019. However, after the Coronavirus pandemic in March 2020, additional information was collected through virtual communication with some participants to collect more data about the impact of the Covid-19 pandemic on E-health and EHRs.

Figure 3. Modified UTAUT2 model for EHCR Adaption

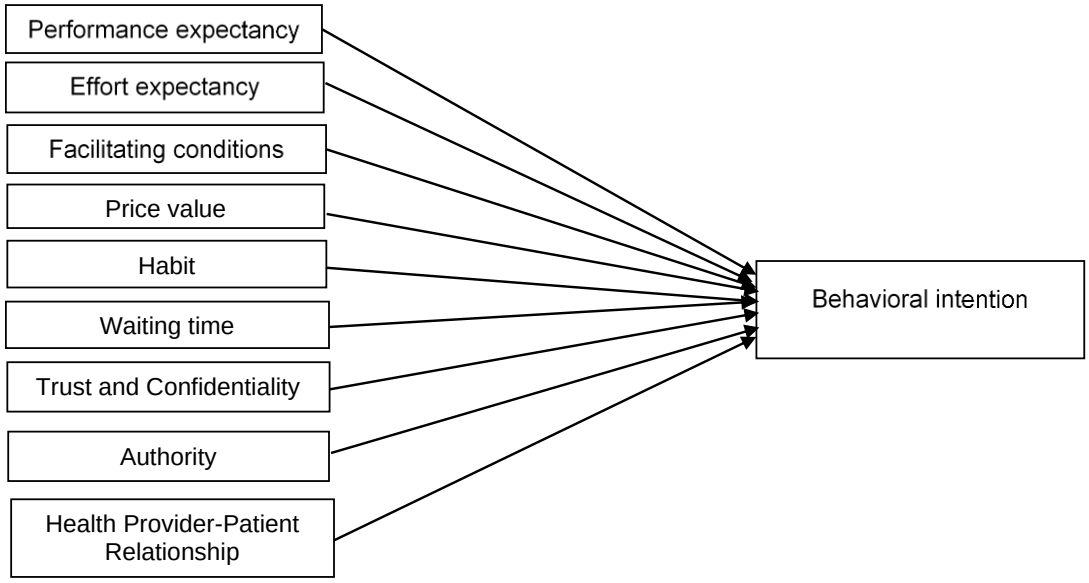


Source: Own elaboration

Research model and hypotheses

The qualitative survey confirmed the factors influencing adoption that had been reported in the literature, which led to five new constructs in the final model and became the foundation for developing the final research model for the quantitative study (Figure 4).

Figure 4. Research model



Source: Own elaboration

According to this model, the research hypotheses are as follows:

Hypothesis 1: Performance expectation (PE) have a positive effect on the behavior intention to adopt IOHT.

Hypothesis 2: Effort expectancy (EF) have a positive effect on the behavior intention to adopt IOHT.

Hypothesis 3: Facilitating conditions (FC) have a positive effect on the behavior intention to adopt IOHT.

Hypothesis 4: Price value (PV) have a positive effect on the behavior intention to adopt IOHT.

Hypothesis 5: Habit have a positive effect on the behavior intention to adopt IOHT.

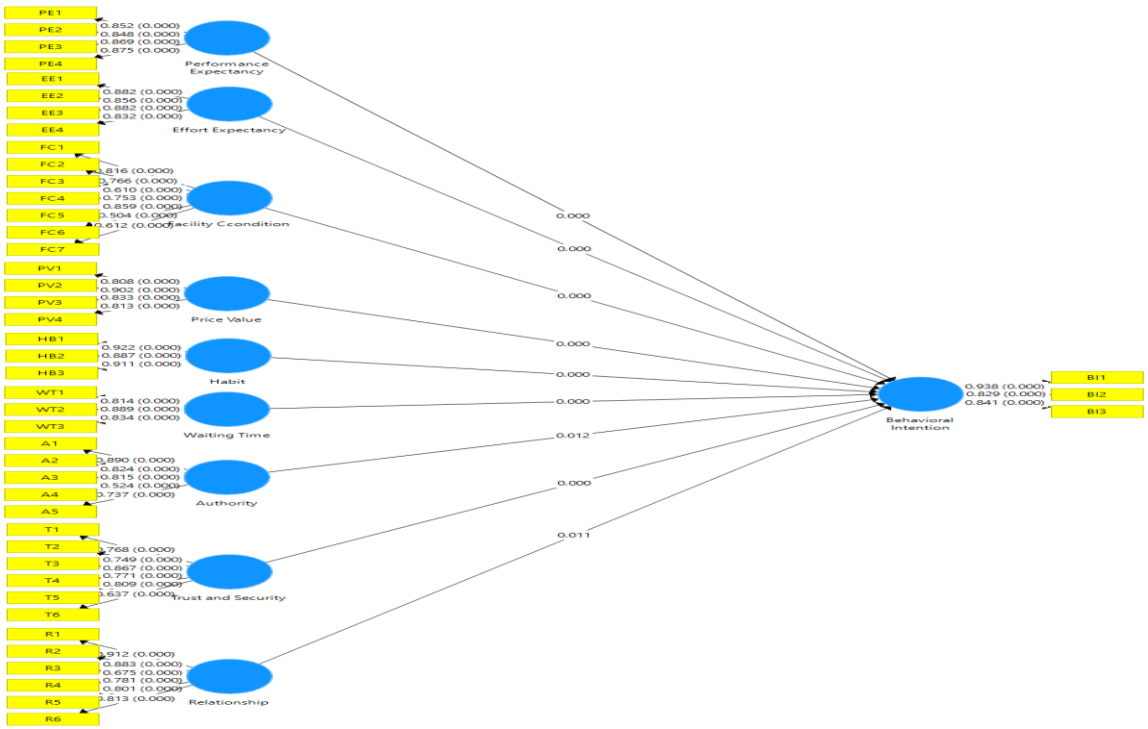
Hypothesis 6: waiting times have a positive effect on the behavior intention to adopt IOHT.

Hypothesis 7: Authority have a negative effect on the behavior intention to adopt IOHT.

Hypothesis 8: Trust and Confidentiality have a positive effect on the behavior intention to adopt IOHT.

Hypothesis 9: Physician-Patient Relationship have a negative effect on the behavior intention to adopt IOHT.

Figure 5. Structural model testing results



Source: Own elaboration

4.1. **Discussion**

The purpose of this study is to in-deep understand of the determinants of health, especially electronic health care records and modify the current UTAUT2 model for the health system to bring this model in line with the characteristics of the health system. However, this thesis goes further as it reinforces the importance of nine factors as determinants in accepting electronic health care information record, and the identified dimensions were confirmed by quantitative method (0.84, $p<0.001$). In this regard, the extraction dimensions are as follows:

1. Performance expectation (PE)

The performance expectation category in the technology acceptance model is the strongest predictor of the behavior intention, and its measurement in both the mandatory and optional status of technology use remains significant (Venkatesh et al., 2003). The healthcare providers use more technologies related to their tasks. Users are more likely to accept certain technologies that will help their efficiency. Therefore, health providers are more likely to accept health technology if they realize that EHCR will improve health care performance and improve patients' health services. These results are consistent with the results of previous studies (Alpay et al., 2010; Årsand et al., 2008; Keselman et al., 2008).

2. Effort expectation

The *effort expectation* is defined as the ease of using technology derived from the perceptual ease of technology acceptance model, which determines the level at which a person comprehends a particular technology or system that will require less effort (Venkatesh et al., 2003). Adopting new technology or systems will be successful when people consider it easy to learn how to use it (Årsand et al., 2008). When there are fewer barriers for using new technology, it would be more acceptance. In this context, ease of use will be a critical factor in reinforcing users' behavioral intention. The results are consistent with the findings of previous researchers (Bhatiasevi, 2016; Park et al., 2007;

Sun et al., 2014; Wang & Communication, 2015) and confirm the expectation effect of effort on behavioral intention.

3. Facilitating Conditions (FC)

Facilitation is defined as the extent to which an individual believes that there is an organizational and technical infrastructure to support the use of new technology (Venkatesh et al., 2003). A potential barrier to use health services and provide health care is the lack of resources or support services that allow users to access and adequately use health technologies, such as electronic healthcare records (Keselman et al., 2008). When users are confident of technical facilities and resources to support the system, there would be more expectations for their acceptance. Knowledge of online access, compatibility between technologies and systems, customer or user support, adequate hardware and software resources, knowledge of information technology, and availability of technical knowledge are likely to reduce barriers in using new technology in terms of Internet infrastructure (Wang et al., 2015). The results also confirm the findings of previous researchers (Aarts et al., 1998; Webb et al., 2009) regarding the effect of facilitative conditions on behavioral intention.

4. Price value

Cost and price may have a significant impact on the use of technology. The price value is obtained from the amount of value perceived by the used technology, which can effectively select and accept technology (Chang & Tseng, 2013; Wang & Wang, 2010). The price value is emphasized by researchers in the field of information technology and technology markets. Findings indicate that the concept of price value is crucial in technology adoption (Kuo et al., 2009; Soltani et al., 1970; Zhao et al., 2012). Cost value is positive when the benefits of using technology outweigh the material costs, and such a value has a positive effect on the intention to use (Venkatesh & Bala, 2008). Accordingly, Vankatesh et al. (2008) described price value as consumers' cognitive exchanges between perceived benefits of services and the monetary costs of use (Venkatesh & Bala, 2008).

5. Habit

Habit structure consists of three criteria: past behavior, reflex behavior, and individual experience. Past behavior is described as previous user behavior. Reflex behavior refers to user behavior customs that are part of everyday life (Kim & Malhotra, 2005). Personal experience refers to the accumulation of everyday experiences, norms and enduring habits created by users to use technology products. Such experiences reduce the need for discussion, coordination, or difficult decisions (Kim & Malhotra, 2005). Previous experiences of using information technology have predicted the intention to use it and facilitate the situation. Habit determinant has been widely discussed in various fields, including psychology, consumer buying behaviors, education, health sciences and management (Limayem et al., 2007). The research results in line with our research on the goals of habits and behaviors resulting from habits have shown that habit predicts the severity of the tendency to use technology to promote behavioral change(Kim et al., 2007; Morton, 2008; Venkatesh et al., 2012; Wang & Wang, 2010; Webb et al., 2009).

6. Waiting time

One of the influential factors that can lead to adoption of technology is the benefits that result from independent time-space interactions to avoid waiting time (Mallat, 2007). Dwivedi et al. (2016) consider that the waiting time dimension increase the acceptance of mobile health technology among users (Dwivedi et al., 2016). El-Wajeeh et al. concluded that saving time due to using health technology increases acceptance (Nguyen et al., 2019). Scheindenhelm Kossman indicated that health technology reduces the time spent at the patient's bedside (Kossman & Scheidenhelm, 2008), which can be effective in adopting the technology.

7. Authority

“Physicians’ Authority” is another new determent that significantly affect the “behavioral intention” of EHR. Physicians are characterized by their high professional autonomy (Jensen & Aanestad, 2006; Venkatesh et al., 2011; Walter & Lopez, 2008). The implementation of EHR contains significant changes that can affect power relations or positions in the medical practice (Abdekhoda et al., 2015).

Resistance is more likely to occur when technology negatively affects job roles, professional status, and independence (Walter & Lopez, 2008). Therefore, resistance to accept technology will likely occur when professional status, work roles, and autonomy are negatively affected (Abdekhoda et al., 2015; Walter & Lopez, 2008). Many studies have shown that perceived threat of professional autonomy has a significant negative impact on accepting EHR among physicians (Abdekhoda et al., 2015; Esmaeilzadeh & Sambasivan, 2012; Hamid, 2013; Walter & Lopez, 2008). Therefore, doctors and other people welcome the implementation of EHR with high computer skills. Awareness of the benefits and positive EHR effects on the work process also reduces their resilience (Terry et al., 2008a).

8. Trust and confidentiality

Unfortunately, one of the most critical problems that have not been completely solved in the Internet environment is data security and information exchange. Indeed, no one likes his/her confidential medical information to be stolen by hackers. Confidentiality concerns refer to the degree to which the health providers, such as physician believes that using EHR would impose a risk to the confidentiality of patients' information. Many studies reported that patient information confidentiality is one of the main factors in the acceptance of EHR and e-health technologies among physicians and other healthcare providers (Boonstra & Broekhuis, 2010; De Grood et al., 2016). Few studies considered the association between confidentiality concerns and physicians' decision to accept and use EHR (Steininger et al., 2015). The study conducted by Yoon et al. (Yoon et al., 2012) showed that the accessibility of regulations to protect doctors from personal obligation for privacy and security breaches or record tampering by external parties was a facilitator to electronic healthcare record adoption.

Physicians and healthcare providers are concerned that patients' information in the EHR system and e-health would be accessible to those not authorized (Boonstra & Broekhuis, 2010). According to (Boonstra & Broekhuis, 2010), physicians are more concerned about the confidentiality of patients' information than patients themselves.

9. Health Provider-Patient Relationship (emotional communication and empathy)

Studies show that empathy and emotion are essential for effective health care services. When doctors listen directly to patients, they feel more relaxed and have better treatment. In addition, effective communication and empathy between doctor and patient positively reduce patient anxiety and depression, which is associated with reduced specific symptoms (Neumann et al., 2011). The relationship between doctor and patient is very important in medicine, described as the basic axis of clinical measures and the foundation stone of good activity in the health system (Lynch et al., 2007). In particular, health care personnel will have more useful and practical health care by paying attention to the patient's feelings and symptoms (Van Dulmen et al., 2002). Some studies show that the use of computers in the doctor checkup room is considered as an obstacle to the efficiency of the doctor's workflow and negligence of patients (Gadd & Penrod, 2000; Hsu et al., 2005; Huber, 2001). The excessive use of the computer in health centers creates communication barriers and leads to patient dissatisfaction (Baron et al., 2005). When doctors are typing, patients may not want to stop the doctors' working process (Booth et al., 2004). Doctors may stop talking when they see information on the monitor screen, and patients try to be silent when they see the doctors are silent because of avoiding interrupting doctors. Their reliance on technology for diagnosis and limited bedside interactions with patients may reduce empathy by losing their listening skills and talking to their patients (Crandall et al., 2006 and Vallabh, 2011).

However, some other studies suggested that EHR technology may improve the patients' relationship with the service provider, such as the doctor, and some patients are even eager to use EHR (Baron et al., 2005; Huber, 2001). Highly skilled doctors anticipate EHR as a source for facilitating doctor-patient communication. However, doctors with poor communication skills consider computers as a threat to doctor-patient communication (Rouf et al., 2007). A patient-based communication seems to be better because the patient's communication and emotional needs are prioritized over health technology, and they are involved in the process. Therefore, it is necessary to pay attention to the component of physician-patient communication in designing IoT health technologies and technologies such as electronic health records. The design and implementation of this system should not overshadow interactions between physicians or health personnel and patients and eliminate some of the interactions.

The present study, like other studies, has faced limitations that are briefly mentioned. Due to the lack of use of IOT in most health centers in Iran, many staff were unfamiliar with IOT, we had to use the well-known electronic healthcare record technology, which was a national IOT project and all health centers were required to use it. Lack of similar research in the field of research led to more time to provide accurate information. Although the sample size is theoretically acceptable, but due to the wide distribution of questionnaires in the country, higher participation was expected, which was affected by coincidence with the corona situation and the involvement of health workers with the corona. This study did not examine patients' opinions. In this study, the survey was distributed and analyzed before the current pandemic. Nevertheless, the motivation of use technologies before and during this pandemic shows many differences. So, during this pandemic, the reactions of users may be changed.

The findings contribute in four different ways. The first contribution is identifying additional factors of electronic health care information record and Health IoT adoption. The results were consistent to Holden and Karsh (2010), Vahdat (2018), and Martínez-Caro et al. (2018) based on the need for developing specific models in the healthcare context (Holden & Karsh, 2010; Martínez-Caro et al., 2018). Second is the adoption of electronic health care information record by exploring and presenting new drivers for filling the gap of the insatiable general model of adopting healthcare, as well as combining and modifying the UTAUT2 model or creating new models. Third is the knowledge of technology acceptance by testing theoretical constructs. As proposed by previous researchers, there is an insistent call for more experimental validation of UTAUT2 in new settings Vahdat (2018), and Martínez-Caro et al. (2018), Jawahar and Harindran (2016), Venkatesh (2012), and the present research opens the way to context-related research (Holden & Karsh, 2010; Jawahar & Harindran, 2016; Martínez-Caro et al., 2018; Venkatesh et al., 2012). Fourth is the use of a mixed methods approach. Most studies were based on quantitative and there was a need for a qualitative study to develop a deeper understanding of a specific phenomenon (Venkatesh et al., 2012). Using interviews and focus discussion groups as a qualitative approach was useful and suitable for modifying the UTAUT2 model, exploring adoption factors, and generating four new

constructs. Finally, quantitative research was used for testing and validating the resulting factors.

Factors influence Health IOT and EHRs in different cultures dimensions. is an interesting topic for **further research.** Additionally, whether the findings regarding EHRs adoption will also hold true, the results differ when changing the users to different background, age and educational. Also, UTAUT 2 modified model and the results will compare to newly released technologies within the field of Health IoT and EHRs. Examining the acceptance of other IoT technologies, such as big data, augmented reality and cognitive systems could be considered in future research. Policies and regulations in the healthcare sector are very important and could impact on induced technology demand in health market that should be considered in future research thus it is suggested that the role of induced demand in technology acceptance be study for further research. It is suggested that the importance of paying attention to the role of emotions and feelings in the design of technologies be examined in separate research. It is worth repeating this study after the Covid-19 pandemic due to the number of changes in Health technologies using.

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