Factors influencing the adoption of Electronic Healthcaere records: An Extension of the UTAUT2 Model

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Abstract

Objectives: In the face of a critical condition such as the Covid-19 pandemic, electronic health care records' usefulness is becoming more apparent. Electronic health services are essential for public health, including prevention, monitoring, diagnosis, prioritization, treatment, and Follow up patients. Regardless of E-health, potential benefits, implementation limitations, and adaption barriers are expected, especially in Electronic Health Care Record. In this regard, it is essential to study the factors influencing EHCR adoption. While theoretical models have studied technological adaptation factors, there is scattered literature on the EHCR adaptation in the field of ehealth. Therefore, this study aimed to investigate the factors influencing the EHCR adaptation in primary healthcare services.

Methods: Qualitative data collection was performed using semi-structured interviews and focus groups to realize EHCR users' perceptions and identify specific determinants. Data collection was performed as a qualitative method among physicians, specialists, health experts, and CEOs.

Results: The results of this study identified 9 determinants and 20 mechanisms affecting each determinant. Based on the findings, a modified UTAUT2 model has been proposed for EHCR in the field of ehealth, which can be used in other researches.

Conclusions: These results can add some theoretical content to the body of literature in this area.

Keyword: Electronic Health Care Record, Technology Acceptance, UTAUT 2

Introduction

Historical prevalence of infectious diseases, from the plague in Athens, which was the first pervasive infectious disease to COVID 19, the most recent global outbreak, has caused irreparable damage to societies and the global economy. The trend of epidemics shows that the prevalence of such diseases has declined in recent decades, but in COVID -19 Pandemic, the need for electronic health and remote health services has been given increasing attention. The term e-health has been used since 2000 (Akematsu et al., 2010; Wickramasinghe et al., 2005). Electronic Health Care Record is one of the important subjects of e-health. In a threatening situation such as COVID -19 Pandemic, Electronic Health Care Record effectively provides public health, including prevention, monitoring, diagnosis, prioritization, treatment, and follow-up patients. Electronic health uses information and communication technology to spread health care information and is used in hospitals to manage the collection of health data or statistical purposes as well. The first proposed of Electronic Health Care Record was to provide medical guidance and treatment for astronauts by Telemedicine used by NASA (Maheu et al., 2002). Indeed, EHR facilitates the processing, sharing, and transfer of data and information in all user groups, including patients, specialists, and health managers (Hannan & Celia, 2013; Yan & Tan, 2014).

Instead, Electronic Health creates a two-way relationship between the patient and the physician (health care providers), made possible through the Internet or other equipment.

While the potential benefits of health technologies, especially EHCR[1] some of the health care providers are reluctant to use it, and its adaptation continues to face limitations and operational barriers. Therefore, in order to adaption electronic health services effectively, many obstacles such as structural, financial, and attitude barriers must be addressed (Anderson et al., 2006).

System failure because of hardware problems, software bugs, lack of control, or environmental factors. In addition to standardization, technical and cost constraints, attitude, and behavioral limitations play a more significant role in new technology adaption (Backer et al., 1995; Terry et al., 2008; Wager et al., 2005). 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 accepting new technology is a significant factor because it depends on social factors, individual

[1] Electronic Health care record

norms, behavioral factors. Users resist in response to the change is one of the important reason in systems failure (Kim & Kankanhalli, 2009).

Therefore, understanding people's behaviors and attitudes is the key factor in predicting the adaption of a technology, which is critical for a successful product and marketing. Accordingly, achieving a successful EHR system requires firstly extensive investment in infrastructure, secondly the implementation of chief changes in the health system, and thirdly requires the readiness of users to cooperate and accept (Poon et al., 2004). Several factors affect users to accept the electronic health record. They argued that examining and identifying the factors affecting the acceptance of electronic health care records will ultimately lead to a complete scenario of how the system will be successfully implemented. Identifying these factors and examining how they relate to the use of the electronic health record is the most serious way to remove human-social barriers, especially user resistance (Malekzadeh & Trojanowski; Morton, 2008; Nair, 2011; Wilkins, 2009).

Therefore, studies on the acceptance of technology attempt to explain how new technologies are adopted by using distinct theoretical approaches. The framework for the use of electronic health should be designed based on the perception and affecting factors. Unified Theory of Acceptance and Use of Technology2 is designed to provide a rigorous framework specifically designed to explain the adoption and use of technology (Venkatesh et al., 2012), which is provided based on UTAUT theory (Venkatesh et al., 2003). In fact, the UTAUT2 model evaluates behavioral intent for the use of technology, which is determined by seven explanatory variables, including performance expectancy, effort expectancy, social impact, facilitating conditions, pleasure-related motivation, and value for money and habit (Venkatesh et al., 2003).

However, 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). Only a few studies have fully focused on the determinants of Venkatesh's UTAUT2 model (Slade et al., 2013). Moreover, there is a lack of studies focused on the use of the UTAUT2 model in the health care context. Therefore, A Literature Review of UTAUT2 shows that 17% of UTAUT2 articles were in shopping contexts such as m-commerce, e-commerce, and social commerce about 13% were in social media, 13% in government service adaption, 13% in public sector context and just only 9% were in the health sector (Kułak et al., 2019). Consequently, this study tries to identify the basic determinants

that affect the EHCR adaption and to expand the UTAUT2 model (Figure 1), which helps to fill this gap.

Research Methodology

Qualitative data collection was performed using semi-structured interviews and focus groups to realize EHCR users' perceptions and identify specific determinants. 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). The statistical sample involved of 24 health providers included eight physicians, three specialists (Pediatricians, Gynecologists, and Psychiatrists), four nutritionists, five health care providers, and four chief executive officers (CEO) purposefully selected. The inclusion criteria were: (1) The inclusion criteria were had an experience the use of EHR in the health care system at least 3 years; (2) had a clinical experience with patients at least 3 years; (3) age between 28 to 60 years; (4) Consent to participate in the study. The exclusion criteria were: (1) Dissatisfaction with participation in Continued research; (2) Lack of proper expression.

At the first of each meeting, the study's topic was fully explained to the participants with an introduction. All participants had experience in the use of EHCR. Interestingly, participants also provided feedback on their patients' experience during using EHCR. Interview locations were based on participants' workplaces or their required location. At the beginning of the interview, conscious consent, confidentiality, and privacy were confirmed. The interviews took about 30 to 60 minutes. At the end of each interview, participants were asked about additional information or related topics that were not discussed. To collect and analyze the interview data, seven steps were used: Topic, Design, Interview, Transcription, Analysis, Confirmation, and Report.

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 Covid-19 pandemic impact on E-health and EHCR.

Data analysis

In this study, the content analysis method was used. The analysis process was in six below steps:

Step 1: Introduction of the data. In order for the researchers to understand the depth and scope of the data, it is necessary for them to immerse themselves in it. Data immersion involves "repeatedly updating data" and actively reading data (searching for meanings and patterns).

Step 2: Create an initial code. The second step begins when the researcher reads the data and becomes familiar with it. This step involves generating basic data codes. The codes show a data attribute on the analyst's opinion. Encrypted data differs from analysis units (themes). The data were analyzed by taking notes on the text and using coloring. The codes were first identified and then matched to the summary of the data presenting the code. The important point at this stage is data summaries and classified in codes.

Step 3: Search for themes. This step involves sorting different codes into potential themes and sorting all the data encoded in the specified contents. The researcher begins by analyzing code and considering how to combine different codes to create a general theme. Second, the validity of the themes concerning the data set was considered.

Step Four: Review the themes. The fourth step begins when the researcher creates a set of themes and reviews them. This step consists of two stages of reviewing and refining the themes. Secondly, the validity of the themes in relation to the dataset was considered. When the map of the themes fits in well, we moved on to the next step. However, if the map does not fit the dataset well, the researcher must return and continue coding until a fitting map is created. At the end of this phase, the researcher must have sufficient knowledge of what the different themes are, how they fit together, and the whole story they tell about data.

Step Five: Defining themes. The fifth step begins when there is a fitting map of the themes. At this step, the researcher defines, redefines, and reviews the themes presented for analysis. It is specified by defining and reviewing the nature of a theme for decided and determined by which aspect of each theme contains the data.

Step Six: Reporting. This stage begins when the researcher has a set of fully prepared themes, includes final analysis and reports writing. Then, to ensure the validity of the results, two different researchers controlled the coding and analysis.

Validation of the conceptual model

Focus groups discussion included 12 participant were used to confirm to confirm the determinants and related measures. Sometimes, the exact same question phrase was not used only to guide each of the determinants. In addition, follow-up questions were asked if it was needed. FGD sessions were created to validate the proposed modified model for healthcare based on UTAUT2. The purpose was to (1) confirm the respondents' concepts or not, (2) to exchange ideas about conceptualization - the order and connection between the former between the determinants and the categories. Moreover, (3) to discuss the respondents' new factors that could be added to the proposed initial model. Interview results were used as a basis for FGD questions. A questionnaire was created to guide the focus groups. Each question was related to a category that was related to a specific determinant. After that, the categories were examined in more detail, and their relationship with the relevant general determinant was examined. Based on the results of 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 (Table 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 EHCR.

Results

Based on the analysis of interviews and FGD sessions, the categories formed 20 separate mechanisms that affect the nine determents of the UTAUT2 model and show the factors influencing the acceptance of technology in a health care system. In the results, we defined the obtained categories.

Category 1- Performance expectation

The performance expectation in the technology acceptance model is the strongest predictor for the tendency to use, and its measurement remains significant in all contexts, both in the compulsory and optional situations of the use of technology. Mostly, healthcare providers use more healthcare technologies that lead to health-related work tasks (Alpay et al., 2010; Keselman et al., 2008).

In this study, both optional and compulsory analytical status of the interviews was obtained. However, the compulsory situation was mainly used to refer to indirectly or directly the induced demand. Examples of quotes:

"Evaluation of the performance of the employees is based on the electronic health record. Employees who provide most of their services through an electronic health care record are comparable to other employees. Employees do it and do not consider it as an extra task. Of course, this problem also leads to the false record of services so that employees falsely record services for people in the system to show their high performance or pretend to deliver more services provided through them" (1) (2). "*We expect our workload technology to be almost reduced"* (3). *"We provide a full-service evaluation based on the system"* (12) (13).

"The system makes better organization of information and health services" (1). *"There is a lot of work in the health care system. The electronic system helps organize*" (2). *The system has merely integrated the services"* (12). *"The convenience that came with it was the coherence of the information"* (3) (2). *"Our workload is almost reduced"* (3). *"We provide a full-service evaluation based on the system"* (12) (13).

Category 2- Effort Expectation or ease to use

The effort expectation is defined as ease of using technology, which is derived from the concepts of perceptual ease of technology acceptance model. The expectation of effort determines the level of effort with which a person understands a particular technology or system that will require less effort (Venkatesh et al., 2003).

Acceptance of new technology or systems will be successful when they believe it is easy to learn how to use it (Lai et al., 2015). The system is more acceptable when there are fewer barriers to use the new technology. In this regard, ease of use will be a vital factor in strengthening consumer behavior's intention.

Examples of quotes:

"It has made our job easier as long as some issues are addressed (1). *"It has helped our work a lot and is easy to use"* (2). *"The first time we used it, we expected our work to be easier and our workload to be reduced* (3). *It made our work easier. At first, it was vague, but it became easier over time"* (6). *"The first time I wanted to work with the system, I was stressed, and I was afraid it would be difficult, but then, I found that it was very easy"* (13). "*It's just boring, meaning that too*

much multiplicity makes patients tired" (2). *"If the care is properly defined and designed according to the needs and circumstances of the people, it will be more useful and effective"* (4). *"A system is appropriate when it is proportional to the educational and positional levels of employees at all organizational levels"* (5). *"Health technologies should be appropriate for any physical condition, such as a disability or low vision. For example, my eyes are weak, and I need a large screen size"* (5). *"(Personally, the monitor screen bothers my eyes (it's better to be audio or for the physically handicapped)"* (13).

Some studies in parallel with this study suggest that illness, low vision, and physical problems are barriers to technology adoption(Lai et al., 2015; Slade et al., 2013).

Category 3- Facilitator conditions and Access

Facilitator conditions are defined as a person who believes that there is an organizational and technical foundation to support this system's use. This issue refers to the degree to which a person believes that there is a technical and organizational infrastructure to support the use of the system(Venkatesh et al., 2003). When users believe in the availability of technical facilities and resources to support the system, they will be expected more to accept it. For example, the Internet infrastructure, the knowledge required for online access, compatibility between technologies and systems, and assistance from others, in other words, sufficient hardware and software resources, information technology knowledge, and access to technical knowledge will reduce barriers to the use of new technology (Lai et al., 2015). A potential barrier to using health care services is the lack of resources or support services that allow users to access and use these health technologies properly, such as electronic health care record (Keselman et al., 2008).

Examples of quotes related to this main category:

"I use the system as long as we don't have a problem with the Internet connection. We often have an Internet problem" (2). *"The number of computers should be the same as the number of people"* (2). *"We have internet problems"* (3). "*People don't like the system, and there's a reason they don't like the service provider because we don't have the right infrastructure and the Internet"* (4).

"Facilitating and infrastructure such as the Internet (6) *and systematic work was difficult at first, especially in the first year, and due to the Internet disconnection, some units still have problems, and there are problems at various levels in some areas, including patient care reporting"* (7).

"I saw that slowing down, or Internet disconnection was an important challenge for e-services. For example, there was a system that I was answering when I reached the last question, or the Internet disconnected. I stopped (with laughing). I had to wait for the Internet to be connected, and the service receiver looked at me in surprise for what I am waiting (by shaking head)" (8). *"There is no necessary infrastructure, at least for technology in Iran, including the Internet and its low speed"* (7).

"I often wonder why they don't check and fix deployment problems before announcing a system or program. Sometimes there are audio, or video problems, inappropriate seats, and I wish I had checked them before. Unfortunately, I see that it only takes a few months and sometimes years after the electronic system is installed to complete the equipment (laughs and shakes its head)" (8).

Category 4- Price value (service cost)

The structure of cost and price may have a significant effect on the use of technology. The cost value is obtained from the amount of value perceived by the technology use that can effectively select and use technology (Chang & Tseng, 2013; Wang & Wang, 2010). Cost value has been emphasized by researchers in information technology and electronics-related markets. This concept has been adopted by accepting smartphone users. The findings suggest that the concept of cost value is very important in technology acceptance (Kuo et al., 2009; Zhao et al., 2012). The cost value is positive when the benefits of using technology outweigh the material costs. Such a price value has a positive effect on the intention to use (Venkatesh & Bala, 2008). According to these beliefs, Venkatesh et al. described the value of prices as consumers' cognitive exchanges between perceived benefits of services and monetary costs for their use (Limayem et al., 2007). Non-monetary costs have been estimated at a cost such as time and effort. In this study, price value is both monetary and non-monetary values such as health promotion to examine the factors affecting the acceptance of electronic health record technology.

Examples of quotes related to this main category:

"The new system's cost is much higher than the previous system, and it is traditional. Most of the costs have already been related to paper consumption, but in the new system, the costs of Internet and telecommunications, servers and computer purchases, etc. have been added" (7).

"It has not affected costs. It may continue to reduce costs. For example, it does not require physical presence and then distance, and services and monitoring are only remote." (6)

Category 5- Habit

The habit of technology was the last factor added to the UTAUT model. Limayem et al. define a habit as the degree to which individuals tend to engage in automatic behavior that results from learning (Limayem et al., 2007), while Kim et al. equate habit with self-efficacy. Habits are organized in two separate ways, although they are relatively similar in concept. First, the habit is considered a repetition of the previous behavior (Kim & Malhotra, 2005). Second, the habit is measured to the extent that the person believes that the behavior is done automatically. Previous experience in information technology has also predicted the use of information technology, the intention to use the system, and the facilitation of conditions. Making a habit has been widely discussed in various fields, including psychology, consumer buying behaviors, education, health sciences, and management (Limayem et al., 2007). Venkatesh et al. (2012) defined habit as the degree to which consumers tend to learn, use technology, or use technology product behaviors automatically (Venkatesh et al., 2012).

The structure of the habit includes three criteria, including past behavior, habitual behavior, and personal experience. Past behavior has been described as previous user behavior. Reflex behavior refers to the sequence or customs of user behavior that is part of everyday life (34). 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 decision-making (Limayem et al., 2007). Studies on habit goals and behaviors caused by habit have shown that habit predicts the intensity of the use of technology in promoting behavioral changes(Kim et al., 2007; Venkatesh et al., 2012; Webb et al., 2009)

Examples of quotes related to this main category:

"There are a lot of workloads, we have a lot of services, and we are used to the electrical system" (2,3).

"As long as we want to get used to it, it will be updated (8). I'm used to it now, and I don't like to work traditionally and manually." (14).

Category 6- Waiting time

One of the effective factors that can make the acceptance of technology relative is the benefits that arise from independent interactions of time and space to prevent waiting times (38). This conceptual definition includes personal choice over an old system in terms of time and space benefits. Dwivedi et al. (2016) also considered the waiting time to effectively accept mobile health technology among users (Dwivedi et al., 2016).

Examples of quotes related to this main category:

"*Because some services take time for people"* (1). "*Provided programs are modified. Options and links become more advanced and more convenient and concise, and less time consuming"* (2). "Because people's waiting time has increased, they are not satisfied with this" (3). *"In terms of time, if structural problems are solved, it also affects time and saves time* (4). *Time is also important because the time made the service providing service superior"* (6).

"But people were more satisfied when the doctor just stamped the form and responded quickly, rather than when the doctor took more time, and people expressed dissatisfaction because they didn't like the long process and said the doctor was bragging about us." (5) "*Patients expect their problems to be resolved in one session, and they often complain that I am just going to see a doctor again and they will not solve my problem in one session"* (4).

"When services are provided to people because the process is long and patients are asked a lot of questions, they interrupt in the middle of the process and do not continue the process" (2).

Category 7- Trust and Confidentiality

Concerns about confidentiality refer to the extent to which a doctor believes that the use of EHR can pose a risk of patient information confidentiality. Many studies have identified patient information confidentiality as a major barrier to physicians and other health care workers, EHR acceptance, and electronic health (Davis; De Grood et al., 2016; Holzinger et al., 2011).

Doctors are concerned that patient data will be available in the EHR system for those who cannot access it. According to Boonstra and Brookwies (Holzinger et al., 2011), physicians are more concerned about patients' confidentiality of information than patients. Disclosure of patient information may lead to legal problems for doctors (Nair, 2011). Threats to patient confidentiality are usually due to poor legal regulations or the design and implementation of a less careful technical system (De Grood et al., 2016). Doctors who use EHR believe that the risks of security and confidentiality are greater than in the EHR paper system (Lai et al., 2015). In addition, in the EHR system, the possibility of exchanging medical information between health care providers, security threats, and patient health information privacy is increased because the data meets the protection standards applied by the health system when sent to another institution. Therefore, the appropriate policies and regulations and conscious satisfaction of patients can be a factor in protecting against the challenge of confidentiality (De Grood et al., 2016).

Examples of quotes related to this main category:

"Information security in data storage is somewhat available, but if someone wants may be able to access it (1)*. "It is somewhat secure, but it is still possible for others to access the data (2). General access is not easy, but if a professional or hacker can definitely"* (6). "*Since the account is personal, it is somewhat secure. However, I'm also worried that the information will be erased or hacked* (12). *Information security is fundamental, and access should be very limited. It's important to store and store information"* (14). "*Most educated people are sensitive and curious about the security and confidentiality of information, and we tell them not to worry that the information is confidential and not accessible to anyone* (4). *The confidentiality of the information is ensured to patients."*

Category 8- Authority

EHR creates fundamental changes that can affect positions or power relationships in medical procedures(Abdekhoda et al., 2015). When technology negatively affects job roles, professional status, and independence, resistance is likely to occur (Abdekhoda et al., 2015). Walter and Lopez (44) have suggested that doctors' concerns about the loss of independence should be investigated in studies to understand doctors' acceptance of information technology. The perceived threat to

doctors' independence is "a degree to which a person believes that the use of a particular system, such as health technologies, reduces their control over working conditions, trends, stages, or content" (44). Many studies have shown that the perceived threat to professional independence has a significant negative effect on doctors' decision to accept EHR(Abdekhoda et al., 2015; Esmaeilzadeh & Sambasivan, 2012; Hamid, 2013; Morton, 2008; Walter & Lopez, 2008). According to the previous studies, three dimensions have been proposed to assess the effect of the perceived threat to professional independence on doctors' acceptance of HER, including increased management control, loss of professional privacy, and limited understanding of independence, trust, and data security (De Grood et al., 2016).

Examples of quotes related to this main category:

"The way of getting familiar with the system was the health and planning system of the ministry itself, and its implementation was absolutely mandatory without asking our opinion and choice" (7). *"We provide all services based on the system"* (13). "*One hundred percent selection and use of systems and technology in health care is the result of rents and the benefits of some individuals or companies"* (4). "*I have been in this place for many years, for example, I visit a pregnant woman whom I know has already had a dead child, and her sister has raised one of her children. I know she can't take good care of her baby. We have to give her husband some things to keep in mind. I have to pay special attention to the period of caring for high-risk pregnant women, but if I don't know my population before and I just content with those courses, there would be some problems that the system can't help."* (8)

"The e-system made good solutions for hypertension. In hypertensive patients, I used to take pressure from one arm. After reading the book that was introduced for hypertension, I realized that when a patient comes because of high blood pressure, it is better to press on both arms. Because of the difference in pressure between the two arms was greater than the limit, we should advise the patient to give the arm with the higher pressure." (11).

Category 9- Health Provider-Patient Relationship (Empathy and Sympathy)

One of the main factors affecting health technologies' efficiency is interpersonal communication, emotions, and feelings. Studies show that empathy and emotion are very important in health care.

Establishing effective communication and empathy between physician and patient has a positive effect on reducing the patient's anxiety and depression, which is associated with the reduction of certain symptoms (Neumann et al., 2011). The relationship between physician and patient in medicine is very important, and the basic axis of clinical measures and the foundation stone of good activity in the health system have been described (Lynch et al., 2007).

In this regard, the relationship between physician and patient with an interface technology such as a computer can be considered a kind of obstacle, which prevents workflow and harassment efficiency for patients and service recipients (Hsu et al., 2005).

Examples of quotes related to this main category:

"There's a problem. Since I've been working with the system, the intimacy with people has decreased, and I'm more focused on the system."

"Heart and emotional connection with people is reduced by people (2). Individual communication is important because the technology and the system do not consider individual differences, but when I feel that there is a need for training in some cases, I try to give the patients the necessary training to help them ”(11).

"Human to human relationship and intimacy between them cannot be compensated by technology. Technology cannot do what the human does. Patients are more comfortable with humans because technology and electronic services are computerized and programmatic" (11).

"Emotional communication and the patient's trust in the care and attention of doctors and health providers is very important." For example, it is not interesting when we enter the doctor's office, and the doctor prescribes without looking at us and eye contact because we feel like they're not listening, and their attention is elsewhere."

"*When we go to the doctor, we prefer that the doctor have a direct connection with us and be present. I think we are rather emotional. It is better for me to my condition, and the doctor gives his/her feedback based on my history and open-ended questions rather than a series of standard and closed questions and steps such as specific and closed questions, which do not pay attention to the fact that it is grateful that the patient or recipient of the service has other questions beyond it, and we do not give this opportunity to it. Emotion is important to me*." (16).

Each question was related to a category that was related to a specific determinant. After that, the categories were examined in more detail, and their relationship with the relevant general determinant was examined. Based on the analysis of interviews and classification of categories, 20 separate mechanisms that affect the nine structures of the UTAUT2 model and show the factors influencing the acceptance of technology in a health care system (Diagram 1 and Table 1).

Table 1) Determinants and related factors extracted from the content analysis results

Determinants	Category (Themes)	Interviews containing semantic codes	The number of FGD respondents who mention this concept before seeing links and determinants	The number of FGD respondents who mention this concept after seeing links and determinants	Validation
Performance Expectancy	Usefulness	1/2/3//22/20/12/13/15/14/10	10	10	Validated
	Efficiency Expect	7/23/2/10/19/1/3/9/11/14			
Effort Expectancy (or easy to use)	Easy to use	1/2/3/6//24/16/17/13/12/24/15/13	12	12	Validated
	Easy to learn				
	Impact of disability				
Facilitation Condition	Hardware	2/4/6/7/8/5/12/11/24/22/1/9	10	12	Validated
	Software				
	Accessibility	24/22/20/19/3/2/1/11/10/9/8			
Price value	Price Value	11/9/21/18/17/3/4/6/1/7/5	8	8	Partially validated

Habit	Technology preference	24/19/2/3/8/1/4/9/12/8/	8	8	Partially validated
waiting time	Reduce waiting time	1/10/9/11/8/16/22/23/24/18/3/24/19/17	11	12	Validated
Trust and Confidentiality	Data security	1/4/6/2/12/14/7/10/11/23/21	12	12	Validated
	Privacy and Medical Ethics	16/4/13/8/11/12/9/10/20			
	Reduce medical errors	1/14/8/11/5/3/20/19/5/7			
Authority	A priority of professional experience	8/11/1/6/5/10/1/3/18/12/24/23/19	12	12	Validated
	Authority to decide	/16/18/4/6/3/8/1//22/24/21/19/10/7/1/10			
	supplier-induced demand	3/4/5/8/7/12/13//11/12/1/10/16/18/24			
Health Provider-Patient Relationship	Interpersonal communication	/22/24/172/11/6/3//12/10/1/8/9/10/15/14/18/19/2/4	12	12	Validated
	Empathy	/2/16/20/217/11/14/11/13/12/23/1/3/5/10/9/24/18/17			
	Sympathy				

Table 1: Determinants and related factors extracted from the content analysis results

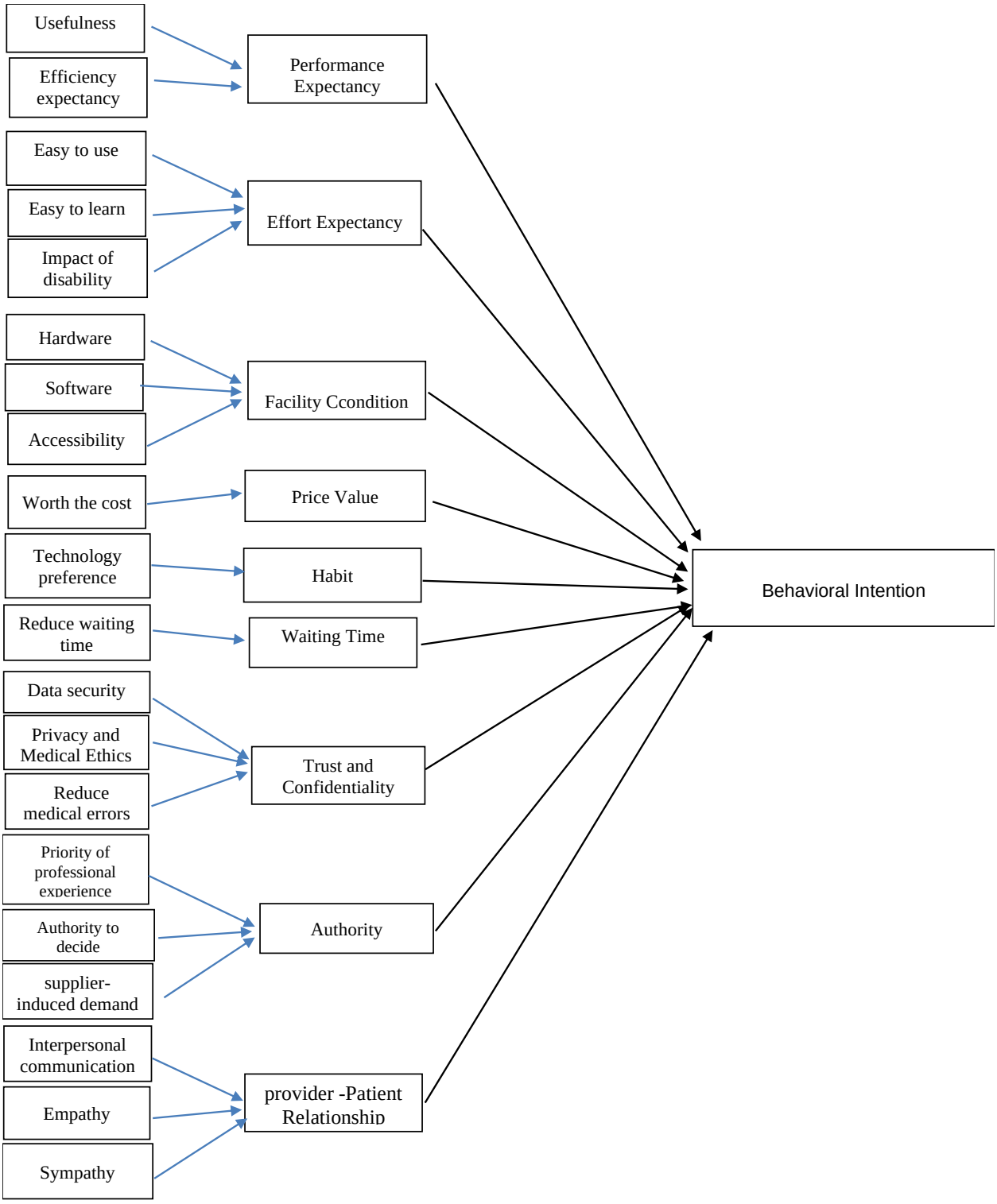

Diagram 1) Modified UTAUT2 model for EHCR Adaption.

Conclusion

The findings of this study suggest an expanded UTAUT2 model to EHCR adaption in the field of Ehealth. The data analysis results in 20 separate mechanisms that affect the nine structures of the UTAUT2 model and reflect the factors influencing the acceptance of technology in a health care system. These results can add some theoretical content to the body of literature in this area.

Limitations and suggestions

This study, like any other study, has its limitations. Further research is needed to validate the proposed mechanisms. Our study validation can also be a framework for influencing behavioral intentions and actual use of EHCR. The findings of the quantitative study can be beneficial and make the results more generalizable. We also encourage more researchers to do more research on the role of technology in physician-patient relationships, which, contrary to all previous studies, points to the role of emotions and communication and the impact of supplier-induced demand.

Ethical considerations

The Ethics Committee has approved this study in the research of the Ferdowsi University of Mashhad with the code of IR.UM.REC.1398.143, which is part of the doctoral dissertation. Participants collaborated with researchers with personal satisfaction.

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